NOVEMBER 17, 1952

Electrical World

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THE *Supervisor's Role...*

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...In Bettering Industrial Relations

...In Working With the Personnel Staff

...In Reaching the Employees

...In Making the Labor Agreement Work

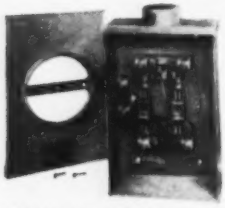
...In Getting Teamwork

Starts on Page 119

SIMPLIFY your meter mounting problems....choose from the COMPLETE Murray line

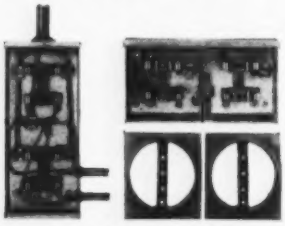
OUTDOOR METER SOCKET

Single or multiple units (saves stippling in the field). Provisions for fifth and sixth jaws. Reversible jaws for vertical or horizontal mounting. Two or three hubs—1" or 1¼". Pressure connectors. Finished in gray baked-on Melamine (a really rugged finish).



OUTDOOR WEATHERPROOF—RAINTIGHT METER SOCKETS

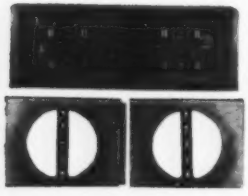
A medium duty socket. Contact surfaces of jaws are silver plated. Single phase installation can be converted to polyphase by substituting polyphase blocks. Sturdy cabinet, built of corrosion resistant steel. The finish is baked-on Melamine. Deep lipped top with hub for 2" conduit, is welded to sides and back. Cover slides under top, over sides and bottom, making device completely raintight. An economical unit.



OUTDOOR SOCKET METER TROUGHS

(Vertical or Horizontal)—

Single or multiple units. On multiple units, line and load terminals at each meter position are lay-in pressure type connectors, which simplify bussing. Line connectors for #4 to #3/0 cables. Load connectors for #4 to #1/0 cables. Made in sizes to accommodate from one to six meters.



INDOOR SOCKET METER TROUGH

(Horizontal)—

Available in one to three meter positions. Can be ganged readily. Line and load terminals are pressure type. Line connectors for #4 to #3/0 cables, load connectors for #4 to #1/0 cables. Lay-in connectors simplify wiring.

TYPE H. D. HEAVY DUTY METER MOUNTING DEVICE

Has a maximum continuous carrying capacity up to 200 Amperes. Can be used with any standard 4 or 5 terminal meter on 1, 2 or 3 phase, 3 wire installations. Where the standard 50 Ampere meter is used, the heavy duty mounting is suitable for 200 Amperes intermittent duty and 150 Amperes continuous duty. Vise-jaw terminals for high-strength, high conductivity. Pressure connectors take line conductor sizes from #6 to #4/0. Equipped with transparent acetate shield for safety in installation and testing. By-pass clamps permit removal or testing of meter without interrupting load. Corrosion resistant, weatherproof case. Supplied with 2" or 2½" hubs.

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An economical device for those whose requirements call for a compact, single position unit. Plenty of wiring room. All connectors are pressure type and take up to #1 wire. 1" or 1¼" hubs available. Melamine finish.

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Murray meter sockets are available in combination with service control equipment. Factory assembly assures a rock-solid, perfectly aligned unit. Service control equipment includes Fully Magnetic Circuit Breakers. Murray Magnetic Breakers always carry the full load, are never affected by ambient temperatures. The sun's rays, for instance, will never cause Murray Breakers to trip. Both socket and service control equipment are finished in baked-on gray Melamine.

Murray can fill all your needs for socket type meter mounting equipment. You can choose any device you need—from the round socket to heavy duty equipment. Ordering and stocking or specifying are simplified when you buy from one source.

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7. Combination Meter Socket and
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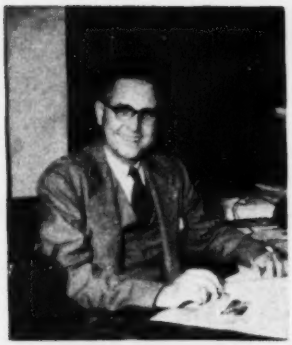

They Met the Deadline

This is Herb Frankel, industrial relations editor of Electrical World, working on the dummies of "The Supervisor's Role" which begins on page 119. Special features such as this mean weeks of work for the editor responsible. But Herb gives most of the credit to the seven authors. Here are their names and companies:

John C. Arnell, Consolidated Edison Co of New York; Edward J. Brill, Pennsylvania Power & Light Co; S. F. Leahy, Detroit Edison Co; J. S. Gracy, Florida Power Corp; .R. G. Kenyon, Southern California Edison Co; Clifford B. Boulet, Wisconsin Public Service Corp; and F. L. Larkin, Wisconsin Electric Power Co.

For them, Herb has the highest words of praise a working editor can bestow, "They met the deadline." This means that each author had his article on Herb's desk at the scheduled time. Newspaper reporters are accustomed to meeting deadlines. But these men aren't reporters. They are among the industry's top industrial relations directors. Any electric utility that could have the seven on its payroll would find its industrial relations problems considerably lessened.

In a field that is new, these men are oldtimers. They are known throughout the industry because of their work on committees of national and regional associations. And geographically they represent all sections of the country.

Men such as these can speak with authority to the industry. And the industry can listen to them with profit. E/W is proud to present their writings.

Electrical World

Published for 78 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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YOU CAN REDUCE TREE TRIMMING, ELIMINATE HIGH POLES

Whether or not to raise distribution from 5kv to 15kv level is a problem being posed by ever-increasing residential growth. If the cost of tree-trimming or overbuilding with high poles is your principal obstacle, consider the proved advantages of Okolite-Okoprene Self-Supporting Cable.

Okolite-Okoprene has an extraordinary record of reliability in both low and high voltage service, is surprisingly economical when *all* costs are considered. In some instances, it costs no more than open wiring. Its maintenance cost is negligible . . . service interruptions and outages are cut to the bone.

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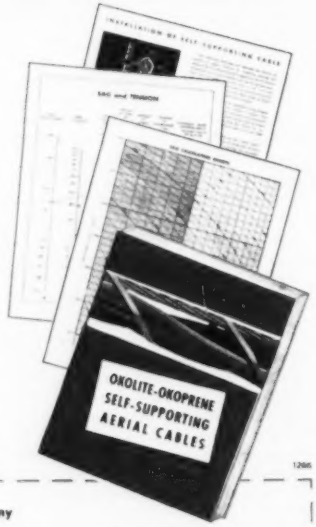

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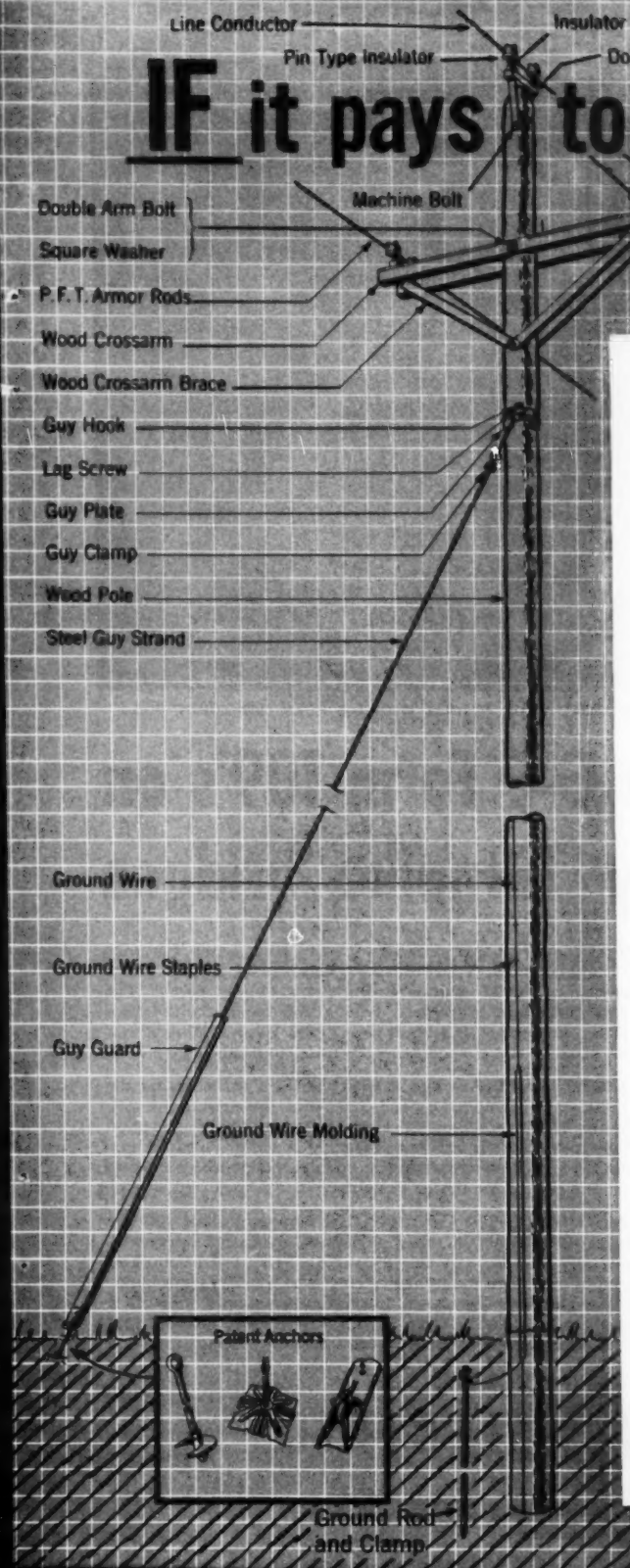
IF it pays to standardize construction



...it pays to standardize on Graybar

It's no secret that you save time and expense through standardization of pole-line construction practice. But, are you aware of the *additional* savings you can make with Graybar as a standard source for all your pole-line supplies?

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GENERAL ELECTRIC

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Problem:

PIPING THAT GROWS...

Solution:

GRINNELL ENGINEERED HANGERS

Eight . . . nine . . . ten inches of thermal deflection! That's not a bit uncommon in today's high temperature, high pressure systems. Very hard-to-come-by, though, is the skill necessary for dealing successfully with suspension problems resulting from *"piping that grows"* . . .

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Grinnell is America's No. 1 supplier of pipe hangers and supports, because Grinnell combines modern manufacturing with expert background knowledge gained during a century of piping specialization. Grinnell has developed hangers and supports for *every* piping need, from the simplest to the most complex. Grinnell, and Grinnell alone, can offer these advantages:

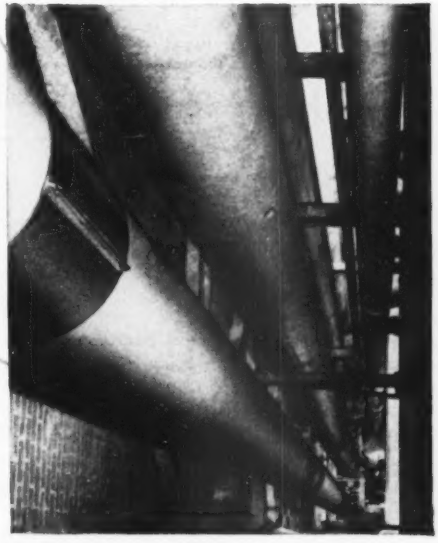
- Complete "start-to-finish" production facilities—including research, design, manufacturing, engineering and field service.
- Practical experience in every type of piping gained during the past 100 years.
- Coast to coast distribution—enabling "out of stock" purchases, anywhere.

Grinnell is always ready to cooperate with engineers and architects in the preparation of pipe suspension specifications. Call Grinnell for pipe hangers and supports.

GRINNELL MODEL L CONSTANT SUPPORTS maintain full safety factor in high temperature, high pressure systems. 3 physical structures accommodate maximum travel requirement of 2½, 5 and 10 inches; 16 sizes collectively cover numerous load ranges between 141 and 19,530 lbs.

GRINNELL PRE-ENGINEERED SPRING HANGERS— maximum variation in supporting force per ½" of deflection is 10½% of rated capacity — in all sizes. 16 sizes available from stock — load range from 74 lbs. to 9000 lbs.

GRINNELL VIBRATION CONTROL AND SWAY BRACES— dampen vibration, oppose pipe sway and absorb shock. 3 sizes give full deflection forces from 200 to 1800 lbs.; have initial precompressed spring forces from 50 to 450 lbs. respectively.



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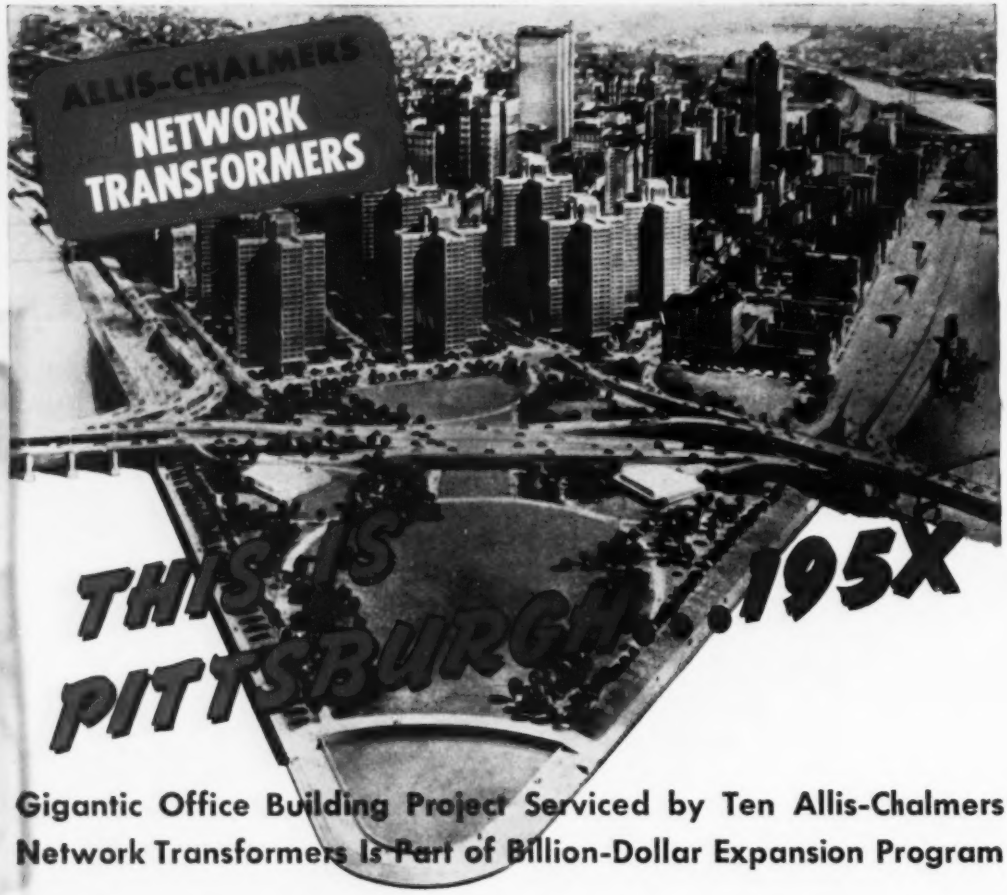


Gigantic Office Building Project Serviced by Ten Allis-Chalmers Network Transformers Is Part of Billion-Dollar Expansion Program

A NEW PITTSBURGH IS RISING out of the dust of demolition crews.

You can see its new face lifting out of the Golden Triangle — and it's an impressive sight. You see the Gateway Center (three of the eight office buildings now planned are completed), the towering Mellon-U. S. Steel Building, the aluminum-faced Alcoa Building, several downtown apartments, the Penn-Lincoln Parkway. And throughout the city thousands of new homes are going up in a booming residential expansion.

In this billion-dollar program, electric power will play a leading role. Allis-Chalmers is proud of its part in helping Duquesne Light Company serve a new, growing Pittsburgh.

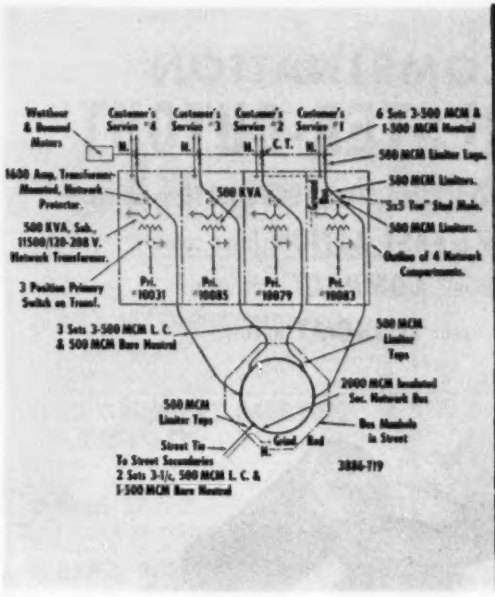
Important components of the expanding distribution facilities are six 500-kva network transformers and four 750-kva network transformers installed to supply energy for lighting and elevators in the present three buildings of the Gateway Center. Each building has its own lighting and elevator transformer banks installed in vaults below street level. The underground transformer vaults are wisely designed for increased capacity when future load growth demands transformers of higher kva rating.

Completely Sealed Design Keeps Maintenance Low

Sealed design is one of the outstanding features of the Allis-Chalmers network transformers. All covers are welded on. That means the main cover gaskets and switch cover gaskets (and maintenance connected with them) are eliminated forever. Sealed design prevents leaks and breathing, thus helping to retard oil sludging and deterioration of insulation.

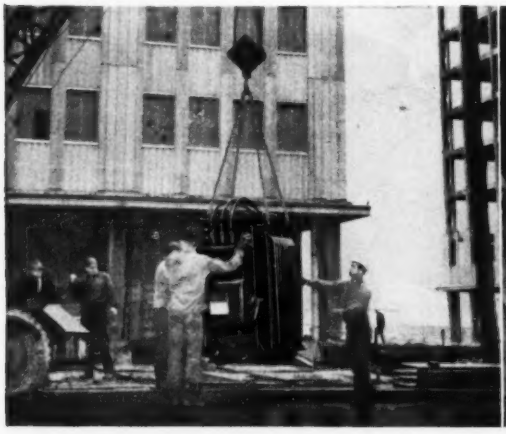
Other big features aside from the proved dependability of Allis-Chalmers transformers are: convenient unobstructed location of accessories; undercoating of base areas for added surface protection; transformer tank grit-blasted; and three coats of baked-on phenolic base paint which afford good water resistance.

Why not investigate Allis-Chalmers transformers for your network system? For more information contact your nearby Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wisconsin. A 3851

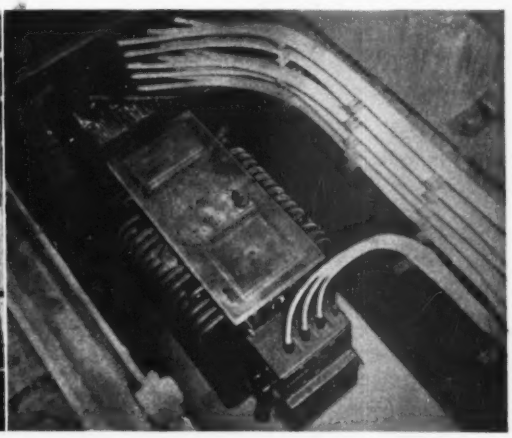


Single-line schematic diagram shows the network system designed for each of the Gateway buildings. Transformers are tied into the Duquesne Light Company's secondary network system, but the distribution pattern within each building is a radial system.

Down she goes. This 500-kva sealed network transformer is one of ten Allis-Chalmers designed units that are now serving the Gateway Center. Five buildings still in the planning stage will have means of expanding to accommodate additional transformers of higher kva rating.



This 750-kva network transformer is lowered into its vault by a Duquesne Light Company crew. Accessories are located to give maximum convenience for periodic inspection. Special surface treatment cuts maintenance.



Pittsburgh is sure to continue to grow. And to allow for future load growth, Duquesne Light Company engineers designed these vaults to accommodate transformers of a higher kva rating. Notice the gasket-free construction.

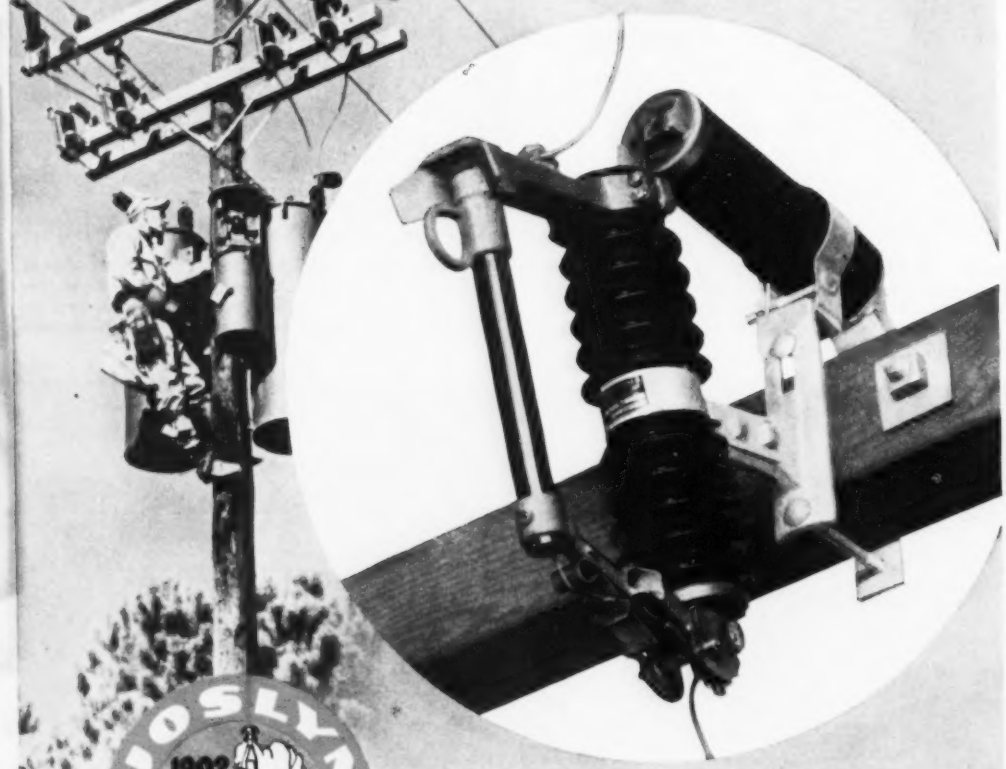
ALLIS-CHALMERS

Network Transformers—Over 1,000,000 KVA Installed

Joslyn "ARRESTER-CUTOUT"

COMBINATION

providing **POSITIVE PROTECTION** from lightning
and a **FAST ACTION** fused cutout
in one **COMPACT** unit with
real **ECONOMY** in cost



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Available also in 15 kv, 100 amp rating.

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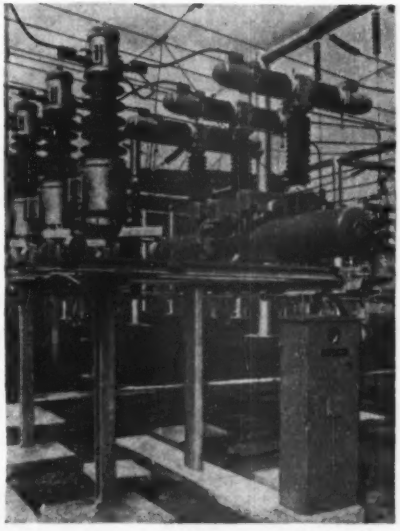
● HIGH SPEED 3 cycles, all voltages, 7.5 to 230 kV	✓	
● RAPID RECLOSING Both 3-phase and single-phase, all voltages, 7.5 to 230 kV	✓	
● POSITIVE INTERRUPTION UNDER ALL CONDITIONS Normal load — short circuits — magnetizing and charging currents	✓	
SAFETY No secondary damage even if highly overstressed	✓	
● AMAZINGLY LOW INSTALLATION COST Duration and cost of installation is only about one-half that of conventional breakers.	✓	
● RAPID & EASY INSPECTION Any vital part, including main contact, is easily accessible . . . can be removed for inspection and re-installed by one man in less than 10 minutes.	✓	
● MINIMUM MAINTENANCE Main contacts are good for 100 full-capacity interruptions without maintenance.	✓	
● PROMPT DELIVERY & LOW INITIAL COST	✓	



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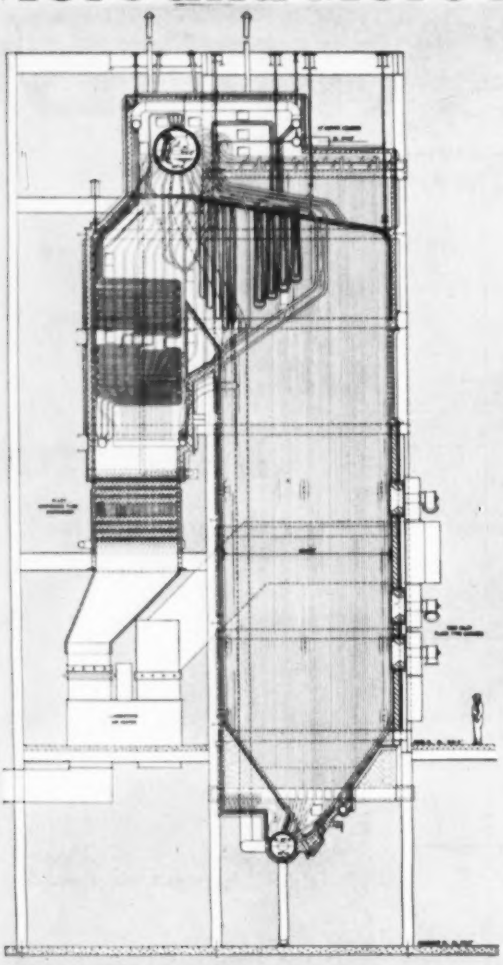

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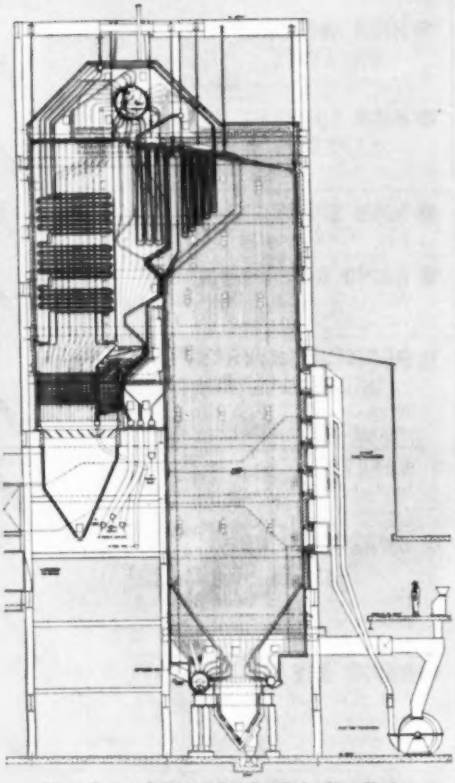

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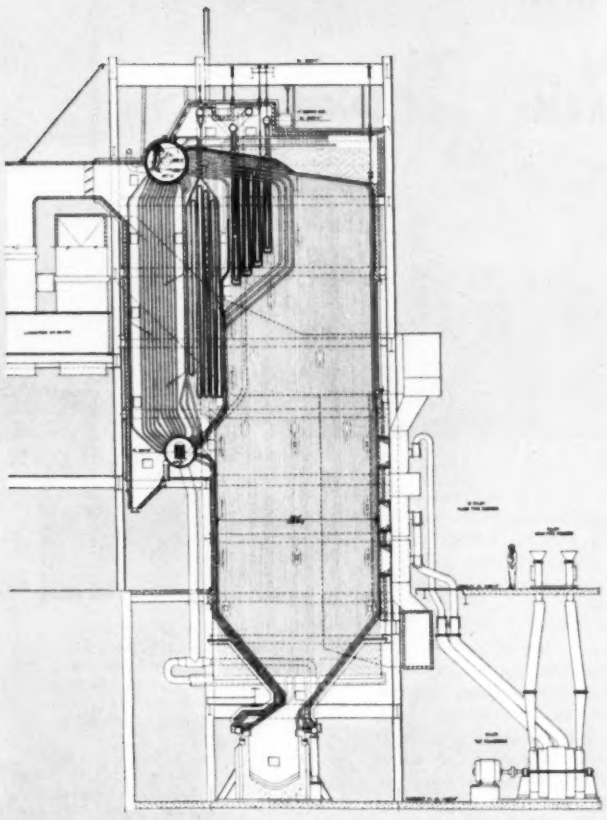
are SWINGING to RILEY Units



MONONGAHELA POWER CO.— THE POTOMAC EDISON CO., Albright, W. Va.
2–700,000 lbs./hr. 1050 psig 950°F.
Fired by Riley "50" Pulverizers
Sanderson & Porter, Engineers

A Few Recent Riley Units for Public Utility Plants

DEPARTMENT OF WATER AND POWER
CITY OF LOS ANGELES, CALIFORNIA
1,200,000 lbs./hr. 2075 psig, 1000°F. and 1000°F. reheat.

LOUISIANA POWER & LIGHT CO.
1,000,000 lbs./hr. 1725 psig, 1005°F. and 1005°F. reheat.

HOUSTON LIGHTING & POWER CO.
1,200,000 lbs./hr. 1700 psig, 1005°F.

SOUTHWESTERN GAS & ELECTRIC CO.
630,000 lbs./hr. 1050 psig, 1005°F.

MONONGAHELA POWER CO.
700,000 lbs./hr. 1050 psig, 905°F.

UTAH POWER & LIGHT CO.
575,000 lbs./hr. 1700 psig, 1000°F. and 1000°F. reheat.

CENTRAL ILLINOIS LIGHT CO.
600,000 lbs./hr. 950 psig, 900°F.

NORTHERN STATES POWER CO.
385,000 lbs./hr. 1500 psig, 950°F.

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY
460,000 lbs./hr. 1025 psig, 900°F.

THE POTOMAC EDISON CO.
700,000 lbs./hr. 1050 psig, 905°F.

IOWA ELECTRIC LIGHT & POWER CO.
300,000 lbs./hr. 975 psig, 910°F.

GULF POWER CO.
325,000 lbs./hr. 1000 psig, 900°F.

SOUTH CAROLINA GAS & ELECTRIC CO.
400,000 lbs./hr. 1475 psig, 955°F.

UTAH POWER & LIGHT CO.
620,000 lbs./hr. 1500 psig, 955°F.

IOWA-ILLINOIS GAS & ELECTRIC CO.
250,000 lbs./hr. 975 psig, 905°F.

PUBLIC SERVICE CO. OF INDIANA
400,000 lbs./hr. 1000 psig, 910°F.

A survey of your Power Plant by a consulting engineer will possibly show ways of making surprisingly large savings in your power costs

COMPLETE STEAM GENERATING UNITS

. . . it will pay you to visit modern Riley Installations before purchasing Boiler or Fuel Burning Equipment

WATER-COOLED FURNACES • STEEL-CLAD INSULATED SETTINGS • AIR HEATERS

Copperweld CONDUCTORS SERVE THE NATION'S FIRST REDDY KILOWATT ALL-ELECTRIC FARM

Representative of the ever-increasing growth and development of rural electrification in the United States is the nation's first Reddy Kilowatt All-Electric Farm, located 12 miles west of Sunbury, Pa.—and served by the Pennsylvania Power and Light Company. We congratulate the men and organizations responsible for this outstanding achievement.

At the same time, we are proud of the fact that Copperweld* Conductors were selected to carry dependable, low-cost power to this fully-electrified farm. Today, millions of miles of non-rusting Copperweld Conductors are providing reliable, trouble-free service at lowest annual cost, all over the world.

For your overhead lines, consider the many advantages offered by Copperweld—the favorite conductors of Rural America. You'll find they're unequaled in economy, long life and all-around performance. Write today for the Copperweld Engineering Data Book—there's no obligation.

*Trade Mark

Mr. Ashton B. Collins, Director of the Reddy Kilowatt Service, unveils the colorful roadside marker designating the Ernest E. Ritter Redridge Farm, near Sunbury, Pa., as the nation's first Reddy Kilowatt All-Electric Farm. Pictured left to right are: Mr. Robert T. Jones, Manager, Farm Sales Department, Pennsylvania Power & Light Company, Mr. Collins, Mr. and Mrs. Ritter.

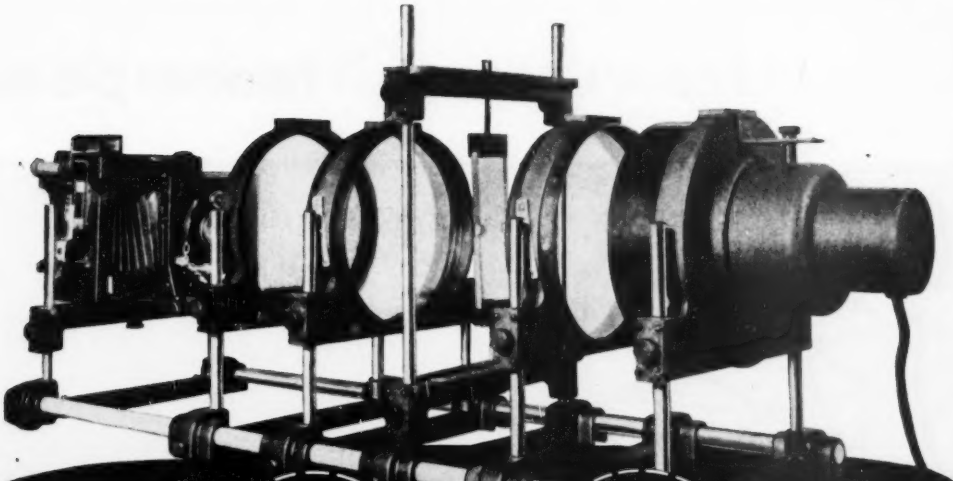
COPPERWELD STEEL COMPANY *Glassport, Pa.*

SALES OFFICES IN PRINCIPAL CITIES

Copperweld TRADE MARK

POWER CONDUCTORS

Cost Less BECAUSE THEY *Last Longer*



simple Stress Studies

with the GR Portable POLARISCOPE

for either Dynamic or Static Photoelastic Stresses

PORTABLE LIGHT WEIGHT LOW COST

The recently announced G-R Type 1534-A Polariscope takes the study of stress analysis out of the laboratory and right into the design office, the drafting room and the demonstration room.

For the study of static and dynamic stresses in transparent photoelastic models, this polariscope opens up many new possibilities in the design of structural members and in the demonstration of stress analysis.

The Type 1534-A Polariscope consists of an assembly of light rods, supports and disc mounts weighing only 32 pounds! The analyzer and polarizer are sheets of Polaroid film which allow the unusually large optical field of eight inches.

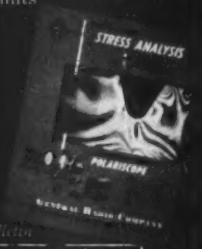
A 100-watt incandescent lamp is used for visual observations; the accessory Type 1532-B Strobolume permits excellent photographs to be taken at 40 microseconds (1/25,000 sec.) with any long-bellows camera having a lens as fast as f 4.5.

The quarter plates and analyzer polarizer plates are easily removed. The instrument is very convenient to use, being simpler than an optical bench. It is only 36 inches long, 14½ inches wide and 16½ inches high, and permits horizontal and vertical adjustments over wide ranges.

Type 1532-B Strobolume *in place, with its power supply at the right. One knurled nut readily removes the Strobolume lamp for substitution of the standard lamp for incandescent visual observation.*

Type 1534-A Polariscope *(for incandescent illumination . . . camera NOT included)*: $490.00

Type 1532-B Strobolume *40-microsecond high-intensity stroboscopic light source for photography*: $265.00

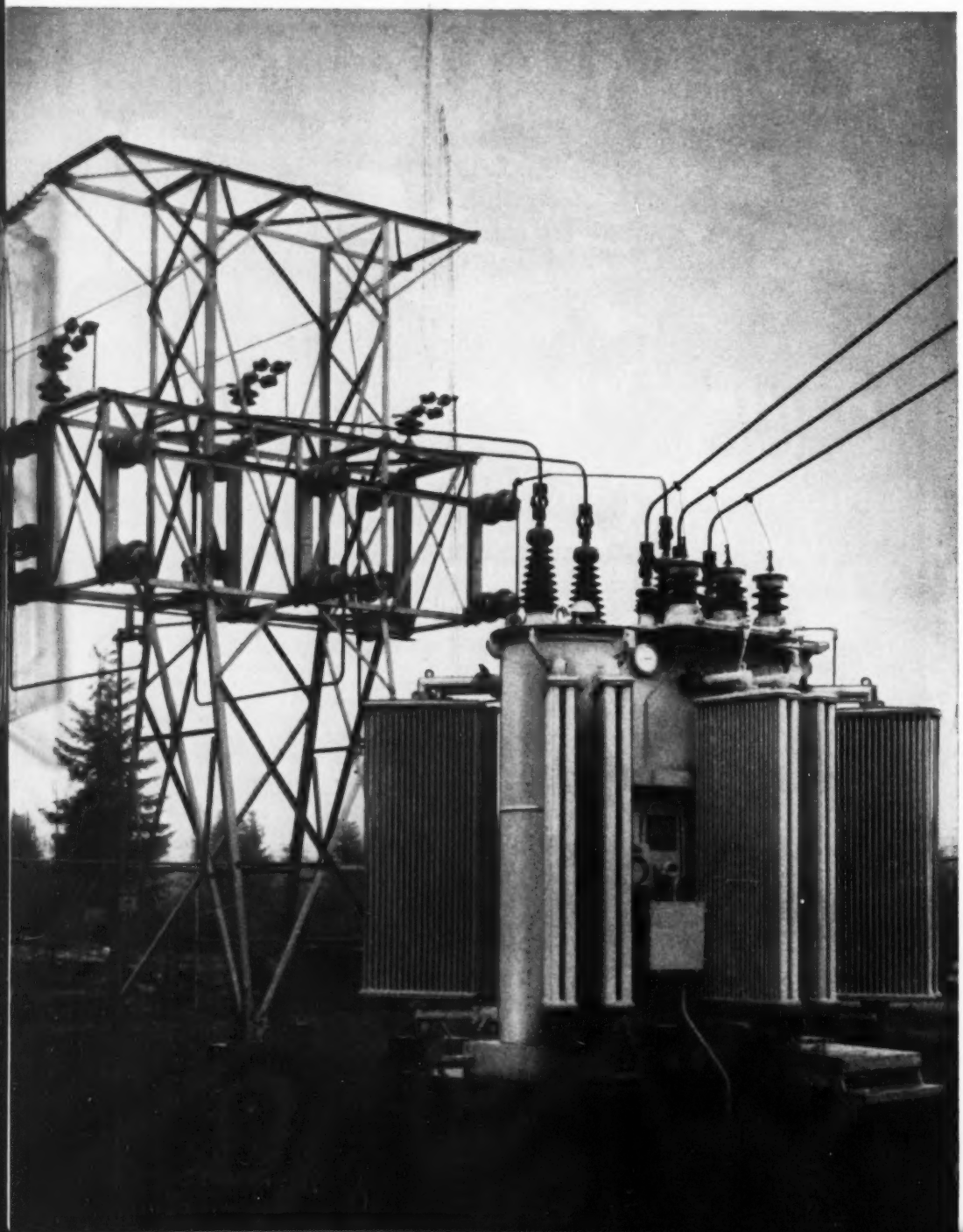


Write for complete information. Ask for the new Stress Analysis Bulletin

GENERAL RADIO Company

275 Massachusetts Avenue, Cambridge 39, Mass.

more power



for the pacific northwest

In an area like the Pacific Northwest, a very highly electrified area, dependable equipment is a must. That's why you'll find many Kuhlman Transformers located in key positions throughout this area.

This 3000 KVA, 3 phase, power transformer rated at 66/33 KV, plays a vital part in helping a major Pacific Northwest utility serve its many customers.

Kuhlman "know-how" began back in 1894 and for 58 years has been developing steadily. For years many engineers believed that transformer development had reached its peak. But in 1935 Kuhlman introduced the famous Bent Iron Core, the predecessor of all wound type designs. Many Kuhlman developments followed; the "Quick-Grip" bushing, oil impregnation of coils, and the forerunner of the modern series street lighting transformer.

Specify Kuhlman. Write us for the name of the Kuhlman representative in your area. For more information about power transformers, ask for Bulletin CS-601.

Kuhlman

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

The complete Kuhlman line includes Distribution, Dry Type, Power, Saf-T-Kuhl, and specialty units.

EXPORT REPRESENTATIVES: *International Standard Electric Corporation,* 67 Broad Street, New York 4, N. Y. Cable address: Microphone, N. Y.

Typical of the many recently installed steam turbines lubricated with Gulfcrest Oil: 40,000 kw. Allis-Chalmers turbine at the Riverside Station of Gulf States Utilities, Lake Charles, La.

GULFCREST is the RIGHT oil for every steam turbine

the RIGHT base stock, Alchlor-processed

the RIGHT combination and concentration of additives

the RIGHT background of performance

Gulfcrest Oil has a background of successful performance in every type and make of steam turbogenerator.

In many of these installations the original charge of Gulfcrest has been in service more than 10 years with no significant change in its original characteristics, and with neutralization numbers always remarkably low and safe.

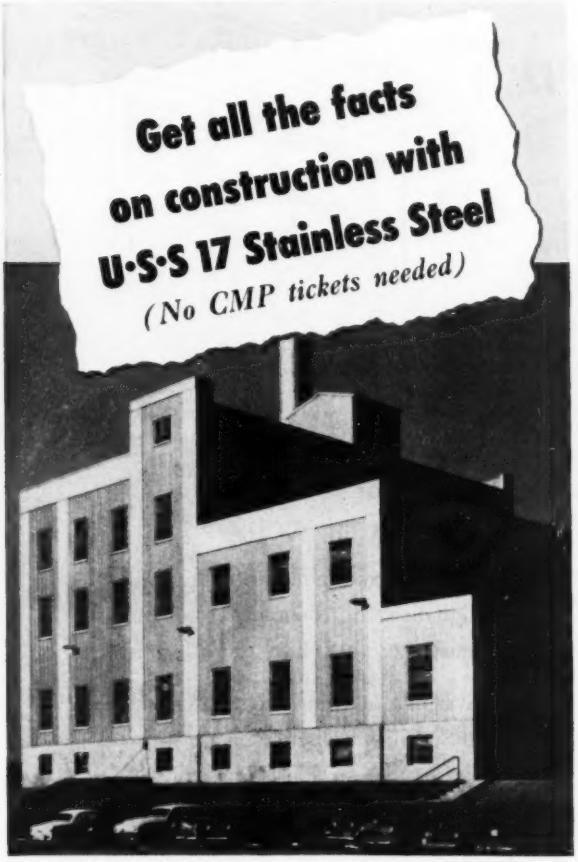
To get this kind of lubrication for your turbine, call in a Gulf Sales Engineer and ask him to recommend the proper grade of this superior oil for your turbine. Write, wire, or phone your nearest Gulf office today.

Gulf Oil Corporation · Gulf Refining Company

Pittsburgh 30, Pennsylvania

GULF SERVES INDUSTRY

Planning a new building?



THIS POWER STATION makes use of Stainless Steel wall panels. It is owned by Northern States Power Company and is located at Minot, N. D.

WHETHER it's a power plant, an office building or any other type of utility structure, Stainless Steel walls and roofs have *more* to offer you today than other materials for this application.

durable

Stainless Steel's corrosion resistance makes it ideal for buildings that must go up and stay up. In highly corrosive atmospheres where ordinary roofing materials lasted only two years, Straight-Chromium Stainless sheets have been found mechanically sound after 25 years of service.

economical

From the cost standpoint, Stainless Steel is competitive with masonry walls, initially as well as in the long run. And because it requires no maintenance, cost-per-year is much lower than that of masonry or other materials. Stainless Steel's greater strength permits the use of lighter gages and, therefore, lighter supporting members, further reducing the initial cost of the building. Fast, all-weather erection and simplified construction are other practical reasons for choosing this material.

available

Most important of all today, the grade of Stainless Steel suited for this type of application is available now without CMP tickets. It is U·S·S 17 Stainless Steel. Its use is described in detail in our new booklet on this type of construction; use the coupon below to obtain your copy.

AMERICAN STEEL & WIRE . . . . COLUMBIA-GENEVA STEEL . . . . NATIONAL TUBE
TENNESSEE COAL & IRON . . . . UNITED STATES STEEL SUPPLY, WAREHOUSE DISTRIBTUTORS
Divisions of **UNITED STATES STEEL COMPANY, PITTSBURGH**
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S STAINLESS STEEL

USS

2-472

United States Steel Company
Room 2806-N 525 William Penn Place
Pittsburgh 30, Pa.

☐ Please send me your booklet "U·S·S Stainless Steel for Walls and Roofs of Industrial Buildings."

*☐ Please arrange to have your customers send me literature on their particular type of Stainless Steel roof and wall panels.

Name ..... Title .....

Address .....

City ..... State .....

**United States Steel is the producer of U·S·S Stainless Steel sheet and strip, not a maker of formed roof and wall panels. These are now being manufactured by a number of our customers.*

UNITED STATES STEEL

Where Application Requires Really Flexible Class H Electrical Insulation . . .

BH "1151"

SILICONE RUBBER COATED FIBERGLAS TUBING

BH "1151" Silicone Rubber coated Fiberglas tubing is flexible when manufactured and *stays* flexible through all applicable NEMA Class H tests. This long-lasting union of two great inorganic materials assures maximum product protection.

BH "1151" withstands bending, required in normal assembly, without loss of dielectric strength—will not craze or crack. It remains unchanged through continuous product operation in a temperature range of −90° F. to 400° F. . . takes 600° F. for 15 minutes without physical or dielectric failure.

Are you looking for a product with high dielectric, chemical and fungus resistance? . . . Use BH "1151".

Available in colors; in economical coils, 36 inch lengths, or cut without wastage to your specifications. Send for samples and data sheets today.

Address Dept. W-11
Bentley, Harris Manufacturing Co.
Conshohocken, Pa.

BH *Fiberglas** SLEEVINGS

*BH Non-Fraying Fiberglas Sleevings are made by an exclusive Bentley, Harris process (U. S. Pat. No. 2303530). "Fiberglas" is Reg. TM of Owens-Corning Fiberglas Corp.

UTILITY DATA SHOWS OUTSTANDING 99.94% PERFORMANCE RECORD FOR L-M VALVE TYPE LIGHTNING ARRESTERS

Six-year performance records of a large midwestern utility show that L-M valve type lightning arresters have an exceptionally good operating record. With a total of 41,175 service years, only 23 L-M arresters had Isolator* operations while in service—there was only one instance of radio interference from L-M arresters—and of 613 arresters brought into the shop for electrical testing, not one was found faulty.

Here are the records for the years 1945 through 1950.

Year	Arresters in Service	Isolator Operations in Service	Number Tested	Failed in Test
1945	3,286	5	0	0
1946	4,322	2	11	0
1947	6,020	2	137	0
1948	7,469	4	118	0
1949	8,686	3	186	0
1950	11,392	7	161	0
Total Arrester Service Years	41,175	23	613	0

23 ÷ 41,175 = .056% failure rate

This substantiates the claims that L-M engineers have always been able to make—that L-M arresters give remarkable protection, excellent performance, and long life with unchanging characteristics.

Testing Greatly Simplified. The Pyrex® glass housing of L-M valve type arresters allows you to "test by sight." You don't have to make an electrical test of every single arrester. Just look at the spark gap—any irregularities can be detected by sight. If the Isolator* is intact you know the valve element is okay. That's all there is to it—if you use L-M Pyrex-housed valve type lightning arresters.

Get Complete Details. For complete information on L-M Lightning Arresters, and details of visual test methods, ask the L-M Field Engineer, or write Line Material Co., Milwaukee 1, Wis. (a McGraw Electric Company Division).

*L-M's "ISOLATOR," watchdog of arrester trouble, gives positive assurance against grounding feeders through damaged arresters, by disconnecting the ground lead from the arrester. (As shown in the operating company records above, in 41,175 arrester-years there were 23 Isolator operations, which provided this disconnecting service.)

80

LINE MATERIAL

Lightning Arresters

Complete Coordinated Equipment for Distribution Today

NEW! EXCLUSIVE!
L-M's 7.5 KV "FAMILY"
of cutouts with interchangeable doors!

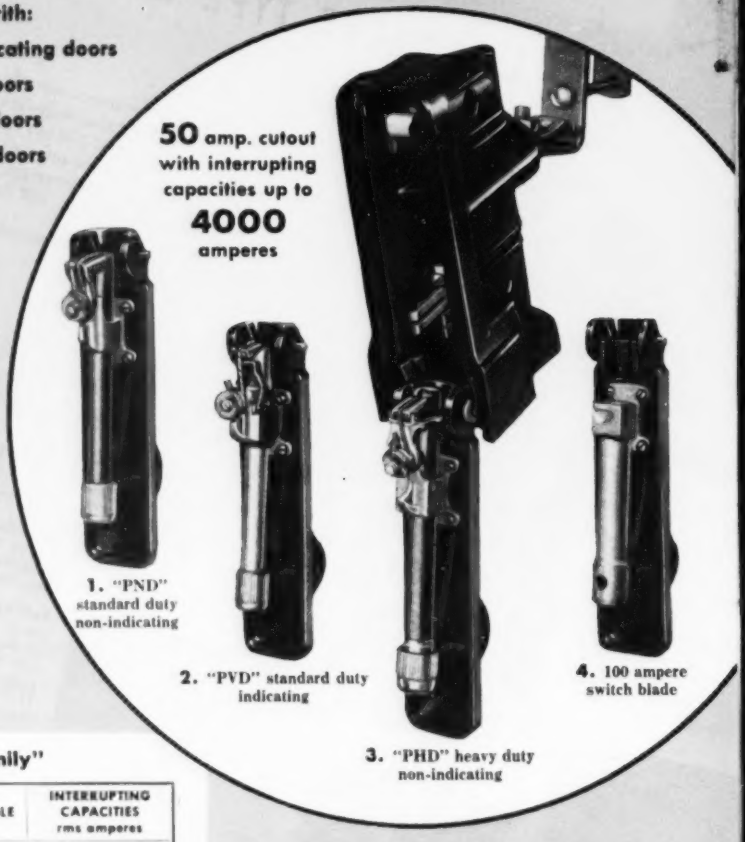
50 and 100 ampere cutouts, each with:
new "PND" standard duty non-indicating doors
"PVD"* standard duty indicating doors
"PHD" heavy duty non-indicating doors
100 and 200 ampere switch blade doors

Here's another L-M "first"! The new 7500-volt family of 50 and 100 ampere cutouts, each with four interchangeable doors to meet a wide variety of services. As operating requirements change, you simply change a door—in 6 seconds the job is done! Saves warehousing, saves installation time, saves in operation.

Safer, too. Doors are removed or hooked on, all with the switch stick. When door is open, all parts are dead.

GET THE WHOLE STORY

Ask the L-M Field Engineer for details on L-M's new "first families"—the 7500-volt family shown here, *and L-M's new 5000-volt family*, also! Or write Line Material Company, Milwaukee 1, Wis. (a McGraw Electric Company Division).


50 amp. cutout with interrupting capacities up to 4000 amperes
1. "PND" standard duty non-indicating
2. "PVD" standard duty indicating
3. "PHD" heavy duty non-indicating
4. 100 ampere switch blade

L-M's new 7.5 kv "Family"

RATING	INTERCHANGEABLE DOORS AVAILABLE	INTERRUPTING CAPACITIES rms amperes
50 AMPERES	1. "PND" standard duty non-indicating	1200 amperes
	2. "PVD" standard duty indicating	1200
	3. "PHD" heavy duty non-indicating	4000
	4. Switch Blade — 100 amperes continuous current rating	
100 AMPERES	5. "PND" standard duty non-indicating	3000 amperes
	6. "PVD" standard duty indicating	3000
	7. "PHD" heavy duty non-indicating	8000*
	8. Switch Blade — 200 amperes continuous current rating	

"PND", "PVD", AND "PHD" are L-M Trademarks

*Available soon

100 amp. cutout with interrupting capacities up to 8000 amperes

5. "PND" standard duty non-indicating
6. "PVD" standard duty indicating
7. "PHD" heavy duty non-indicating
8. 200 ampere switch blade

LINE MATERIAL
fuse cutouts

Complete Coordinated Equipment for Distribution Today

L-M's NEW PID
5 KV 100 ampere
intermediate duty cutout.
Reflective markings easily seen from the ground identify the door and cutout. Doors are easily removed and replaced with a switch stick, for safety.
Cutout rating and date of manufacture sandblasted into side of box for permanent identification.

L-M's New PID Cutout Provides Up To 166% Higher Interrupting Capacity At 20% Lower Cost

Costs 20% less than standard 100 ampere cutout; interrupting capacity 166% higher at 2.5 kv (8000 amperes), 66% higher at 5 kv (5000 amperes). Box will accept all standard 50 ampere doors, thus permitting one box to be used for both 50 and 100 ampere service. Also takes 200 ampere switch blade door.

L-M's PID Cutout is designed to provide a 100 ampere intermediate duty cutout at an appreciable saving over standard 100 ampere cutouts. Boxes are smaller and more compact than standard 100 ampere cutouts—they are the same size as a 50 ampere cutout but terminals and contacts are heavier. Thus the cutout will take any of L-M's 50 ampere doors, as well as the 100 ampere intermediate duty and 200 ampere switch blade door.

The non-disconnecting door provides positive link ejection and circuit interruption even on low current faults.

Both cutout and switch blade doors can be removed and replaced with standard switch sticks, providing additional safety.

Cutout and disconnect switch doors are easily identified from the ground by the reflecting markings on the doors. Rating and date of manufacture are sandblasted into sides of box for permanent identification.

Get Details on L-M Fuse Cutouts

L-M offers complete families of open and closed type cutouts to meet a wide range of requirements. Interchangeable doors offer low first cost and economical capacity increases as loads are increased. For complete information ask the L-M Field Engineer or write for bulletins. Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

LINE MATERIAL
fuse cutouts
103

Complete Coordinated Equipment for Distribution Today

WE *Did* SOMETHING ABOUT THE WEATHER!

Look for the light yellow coating — inside and out. Easy bending, non-flaking Triangle hot-dip galvanized conduit is also supplied with end-caps for protection of threads during shipping and handling.

-And Eliminated a Number of Headaches for You

Conduit is often subjected to external conditions—rain, snow and sleet, for instance, which cause rust despite the best hot-dip galvanizing.

Triangle engineers long ago solved this problem with a revolutionary lacquer-like coating on the inside and outside of our hot-dip galvanized conduit. Slightly yellow in color, this hard, tough coating—along with the hot-dip galvanized finish—prevents water, salt, chemicals and other elements from reaching the metal. It prevents the formation of rust or corrosion and acts as a primer or base—coat for future maintenance painting. It also helps prevent flaking when the conduit is being bent.

This special analysis coating is standard on *all* Triangle Conduit.

Obviously, Triangle conduit with this remarkable coating not only protects the conduit during shipping, storage and handling, but also makes the conduit *last longer* in service.

If rust or corrosion or any adverse condition is a problem for you, it will pay you to specify Triangle conduit. Ask your distributor!

The Trade Mark of **TOP** Quality

TRIANGLE CONDUIT & CABLE CO. Inc.

New Brunswick, New Jersey

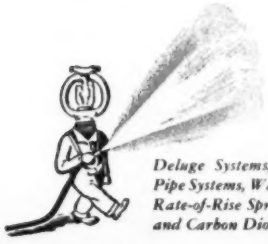
"Glazon" Building Wire • "Glazon" Non-Metallic Sheathed Cable • Control Wire • Armored Cable • Service Entrance, Service Drop Cables • Varnished Cambric, Braided or Leaded • Trioprene Trench, Power & Parkway Cables • Bare Wire • Rigid Conduit Hot-Dipped Galvanized & Black Enameled • Electric Metallic Thin Wall Conduit • Flexible Steel Conduit.

CHALLENGER IS SMOTHERED IN FIRST MINUTE OF FIRST ROUND!

The real hazard of a transformer fire is the resulting black-out of power and light service to homes, hospitals, defense plants and municipal properties. You can protect your customers by protecting your transformers with a BLAW-KNOX AUTOMATIC FOG SYSTEM.

Through fast-acting, rate-of-rise thermostats, any critically hot transformer is instantly blanketed with a heavy, quenching "fog" of water, confining the damage and protecting adjacent areas . . . materially reducing power failures in both frequency and extent. Without obligation Blaw-Knox engineers will survey your fire hazards, make a layout of the most efficient system and estimate costs. Blaw-Knox Fire Protection Systems carry the approval of all underwriters.

BLAW-KNOX SPRINKLER DIVISION
OF BLAW-KNOX CONSTRUCTION COMPANY
829 Beaver Ave., N.S., Pittsburgh 33, Pa.
Offices in Principal Cities



"LITTLE JOEY SPRINKLER"
Always on the Job

Deluge Systems, Wet Pipe Systems, Dry Pipe Systems, Water Spray and Fog Systems, Rate-of-Rise Sprinkler Systems, and Foam and Carbon Dioxide Extinguisher Systems.

BLAW-KNOX
AUTOMATIC FIRE PROTECTION SYSTEMS

NO HOUSING PROBLEM

. . . with this Outdoor Motor

Weather-Protected MOTORS

BEST WAY to solve a housing problem is to eliminate the need for housing! That's exactly what the Allis-Chalmers weather-protected motor does. It eliminates the need for a costly building . . . costly in added capital investment, costly in upkeep, and costly in extended construction time.

IF you're in New York for the *20th National Exposition of Power and Mechanical Engineering* (December 1-6), be sure to see the 1750-hp, 3575-rpm Allis-Chalmers weather-protected motor.

Grand Central Palace
Booths 3-4-5

Proved by Special Tests

We know this weather-protected design can give you these savings . . . plus dependable performance . . . because we've tested it under extreme conditions.

Take the 900-hp, 435-rpm, 4160-volt motor shown above. While running at normal speed and voltage, it was deluged with water at rates up to 40 inches per hour — driven by winds up to 75 miles per hour. This was done repeatedly from all angles. But on inspection, no moisture was detected on the windings of this weather-protected motor.

And other tests checked its effectiveness in keeping out wind-driven fine sand.

Bulletin Describes Features

The construction features that provide this economical, super-splashproof performance are available in ratings for all major auxiliary drives. For more information, ask your nearby A-C representative for Bulletin 05R7874, or write to Allis-Chalmers, Milwaukee 1, Wisconsin. A-3906

ALLIS-CHALMERS A-C ALLIS CHALMERS

PHILCO

Advanced Design MICROWAVE

COMMUNICATIONS SYSTEMS

ENGINEERED FOR GREATEST ECONOMY!

Philco *Advanced Design* Microwave Systems are unsurpassed in reliability, performance and economy. They are designed to give you the greatest value for your communications dollar!

Finest quality components, conservatively rated, insure long life and economy of operation and maintenance. Years of production experience enable Philco to produce microwave systems for the lowest possible cost consistent with highest quality.

Philco *Advanced Design* Microwave is flexible. The broadband microwave channel may be divided to carry up to 24 simultaneous 2-way telephone conversations . . . or be further divided for telegraph, teletype, telemetering, signaling or supervisory circuits. Future expansion can be easily accomplished with no loss of original investment.

Philco *Advanced Design* Microwave Systems give you maximum reliability . . . plus *low cost* installation, operation and maintenance. *Don't settle for Less!*

PHILCO CORPORATION

INDUSTRIAL DIVISION

PHILADELPHIA 34, PENNSYLVANIA

ANOTHER HOLAN FIRST

An important advance in aerial ladder design is achieved by Holan Engineering in this new *fully hydraulic* unit. Every action of the ladder, rotation, elevation, extension ***and retraction***, is accomplished by hydraulic power, controlled by one conveniently located multiple-plunger hydraulic valve.

Greater flexibility, faster action, maximum extension with complete safety and high ratio of in-service usefulness mark this new ladder (2100 series) as another outstanding "scoop" in development of profit-protecting utility equipment. It will be available with 27, 31 or 35-foot *platform* height.

SUMMARY OF FEATURES

1 *Fully hydraulic* operation, powered by individual gasoline engine integral with ladder or by truck-mounted power take-off.

2 Unlimited swing, with 360° rotation by worm wheel and gear. Infinite number of elevation positions through 75° working range.

3 Fly section extended *and retracted* by hydraulic winch.

4 Adjustable platform. Safety belt loops on fly section.

5 Pre-set relief valves control pressure, prevent overstressing rung locks and end stops. Large hydraulic elevating cylinder permits low working pressure.

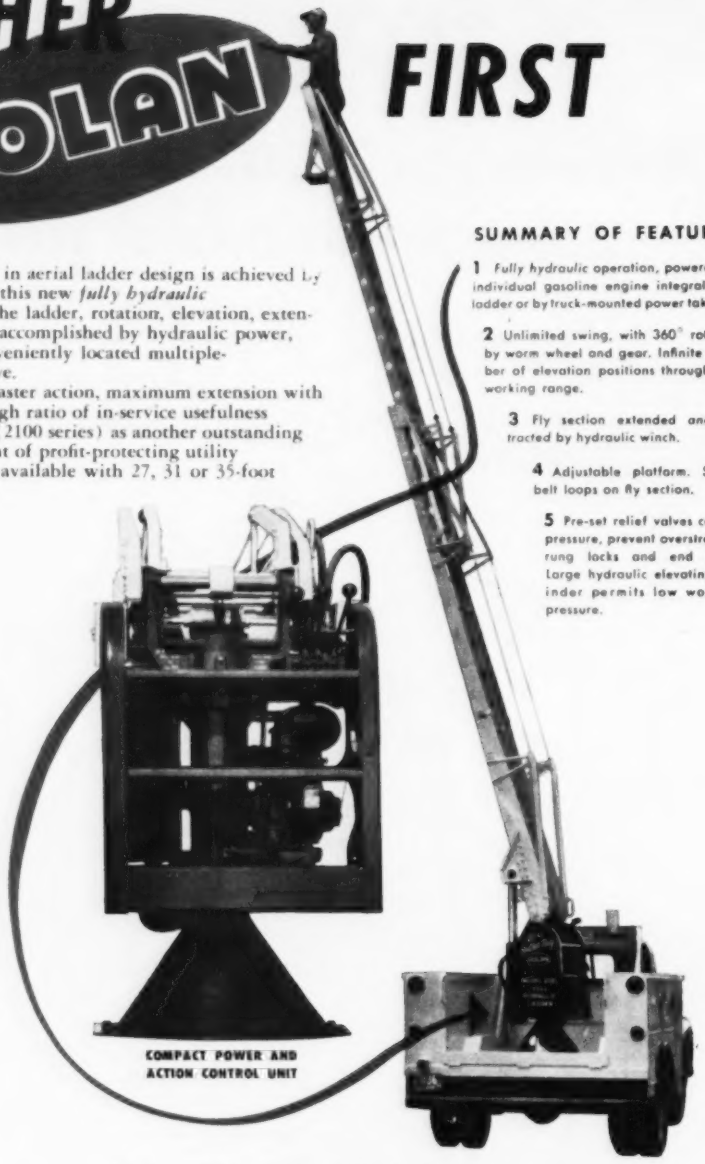
6 Conveniently located multiple-plunger valve with throttling action, controls all operations, permits precise spotting.

7 New bridge-type truss design on both sections gives ladder that safe rigid feeling.

8 New clamp-type rung brackets add to rigidity, permit rung removal without tearing down ladder.

9 New front support, with completely automatic cam-and-roller hold-down, attached to body.

10 Access ladder with non-skid treads.



COMPACT POWER AND ACTION CONTROL UNIT

DISTRIBUTORS

Baker Equipment Engineering Co.
Summit and Norfolk Sts., Richmond, Va.

Baker Equipment Engineering Co.
2401 Hutchison Ave., Charlotte, N. C.

Baker Equipment Engineering Co.
Shop Road, Columbia, S. C.

Schetky Equipment Corp.
1810 S. E. 10th Ave., Portland 14, Ore.

The dependable name in utility bodies

J. H. HOLAN CORPORATION

BODIES AND ACCESSORIES FOR UTILITIES
4100 West 150th Street — Cleveland 11, Ohio

DISTRICT SALES REPRESENTATIVES

2754 N. 92nd Street
Milwaukee 10, Wis.

863 Wilson Drive
New Orleans, Louisiana

6-03 161st Street
Beechhurst, Queens, N. Y.

Which Square D Control Center will do *Your* job best?

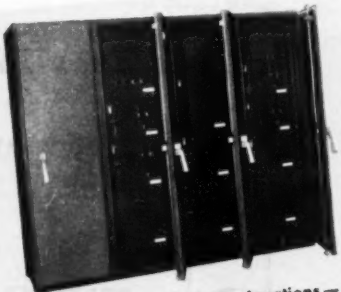
1. STANDARD
2. BACK-TO-BACK
3. DUST-TIGHT
4. WEATHER-PROOF
5. FILTERED AIR

1 Standard Square D Plug-in Control Centers in Nema I enclosures are designed for the majority of installations.

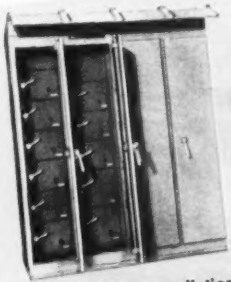
SQUARE D FOR FLEXIBILITY! Square D's plug-in units can be removed, added, or exchanged at will. Both fusible switch and circuit breaker types available. Standardized sections and units are 100% reusable after plant conversions or rearrangements.

Write for Bulletin 8938. Address Square D Company, 4041 North Richards Street, Milwaukee 12, Wisconsin.

2 Space an Important Factor? Back-to-back Nema I enclosures provide maximum concentration of control in limited space.



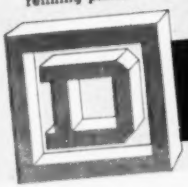
3 for Excessively Dusty Locations—felt-gasketed, dust-tight, Nema V enclosure. A "natural" for foundries, smelting and refining plants.



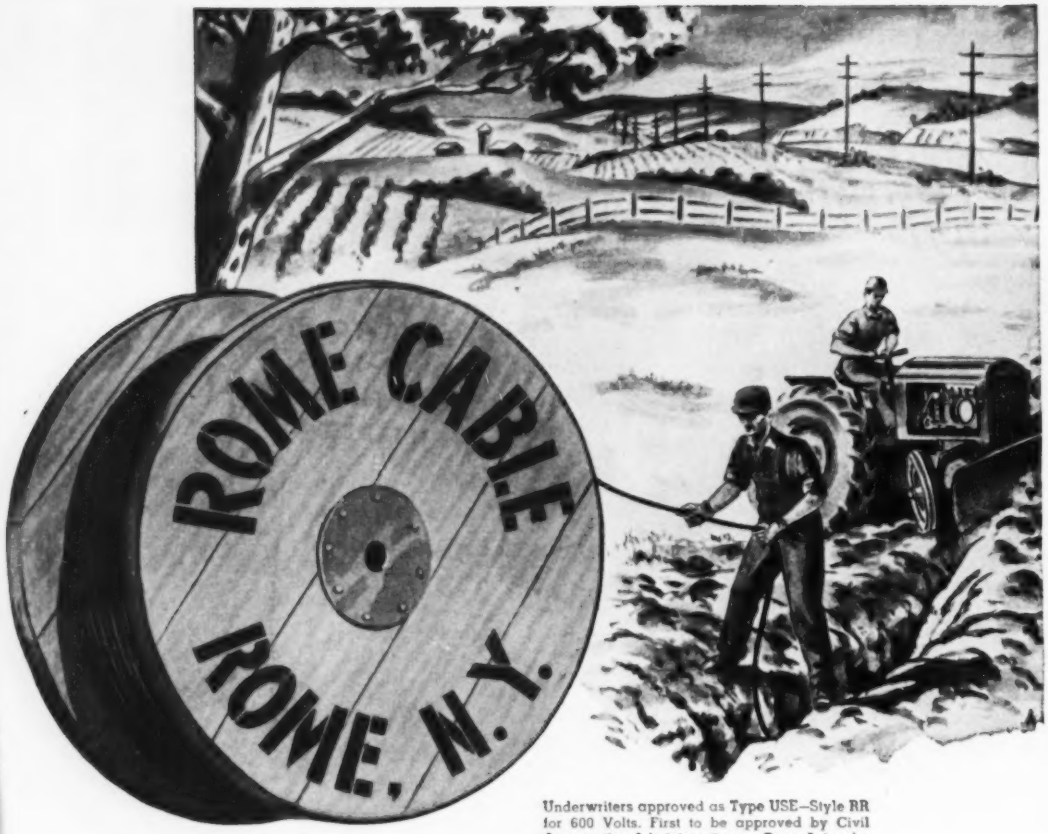
4 for Outdoor Installations—rubber-gasketed, Nema III enclosure protects equipment from weather. Special rust-proof, vinyl-clad finish.

5 Need Filtered Air Protection? Built-in fan and filter combination pressurizes enclosure for moderately dusty or certain types of corrosive atmospheres.

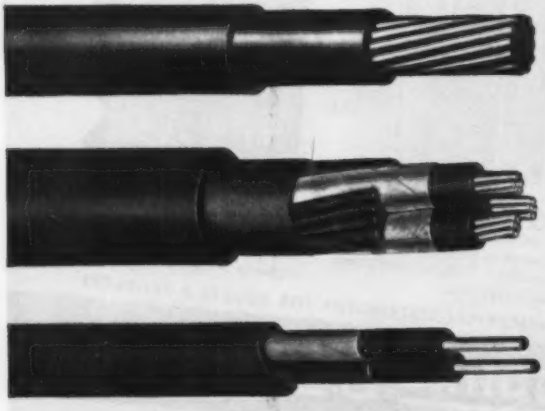
ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS



SQUARE D COMPANY



Underwriters approved as Type USE—Style RR for 600 Volts. First to be approved by Civil Aeronautics Administration as Type A insulation for airport wiring under Specification L-824.



RECOMMENDED FOR

DIRECT EARTH BURIAL

OVERHEAD

IN CONDUIT

Insure Your Power Load With

RoMarine - RoPrene

ALL-PURPOSE POWER CABLES

Street Lighting Cables

Rome manufactures a wide range of high and low voltage cables for underground, or overhead wiring of series and multiple lighting systems . . . *designed to meet your requirements.*

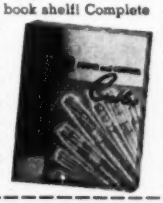
RoZone*-RoPrene Series Street Lighting Cable—5000 Volts

RoLene-Rome Synthinol* Series Street Lighting Cable—5000 Volts

RoLene Ornamental Pole and Bracket Cable—
4000 to 12000 Open Circuit Voltage

Send for your copy of revised Power and Control Cable Catalog

This new sixty-page catalog will be an important addition to your book shelf! Complete in every detail, it includes descriptions, test data, specifications and suggested applications for all Rome Power and Control Cables. You'll find it invaluable for specifying. Mail coupon below today!



*T. M. REG.

You can't beat RoMarine-RoPrene for secondary network circuits, underground entrances, street lighting, or general purpose wiring. Exceptionally versatile, it is equally at home in country or city . . . can be installed direct in earth, in underground ducts, conduit or in air. If it's RoMarine-RoPrene you *know* you're right.

For long, economical service life RoMarine-RoPrene gives you *double protection* against costly circuit failures. RoMarine insulation affords high resistance to heat and moisture. The RoPrene (Neoprene) sheath has excellent resistance to oils, acids, alkalies, corrosive fumes, flame and abrasion. Its wide acceptance attests its popularity . . . hundreds of thousands of feet in service have proved its dependability.

RoMarine-RoPrene is less costly, easier to handle, tap and splice than lead sheathed cables. It is unaffected by electrolysis, extreme temperature changes and installed underground provides insurance against power outages from destructive storms. Its versatility reduces inventory.

IT COSTS LESS TO BUY THE BEST

ROME CABLE CORPORATION, Dept. EW1, Rome, N. Y.

Please send copy of new Rome Power and Control Cable Catalog.

Name .....

Company .....

Address .....

City ..... Zone..... State.....

ROME CABLE
Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

ROME CABLE ROME, N.Y.

Solid-Silver to Solid-Silver Roller-Wipe Contacts . . .

on PACIFIC ELECTRIC

Types SW and SWA
Pole Top

AIR SWITCHES

These contacts in advanced form are used on Pacific Types SW and SWA Air Switches because they assure maximum reliability and minimum cost of upkeep.

The Type SW is similar, but has three insulators.

7.5 to 46 kv
400 and 600 amp
(Other Types 7.5 to 230 kv)

AIEE, ASA, and NEMA STANDARD

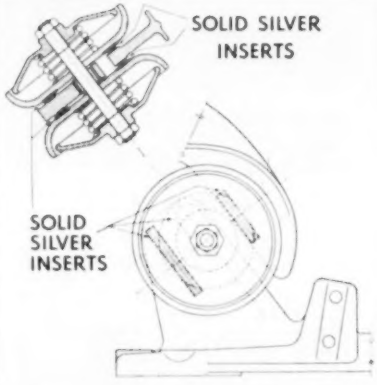
Type SWA 23-kv, 600-amp Switch Unit (a complete switch comprises three such units, operating mechanism, and usual accessories).

DURING PACIFIC'S 46 years of manufacturing air switches* numerous contact materials have been used, and applied in various ways. Unmistakably this experience points to thick silver inserts, silver-brazed to body and blade, as best meeting today's requirements—provided contact pressure is maintained between 50 and 90 lbs. Data in support of this are in Publication DS 195, "Design of Air Switch Contacts for Maximum Performance," mailed on request.

But it is not enough that suitable contact materials be used; the mechanical design must provide cool operation, low millivolt drop, low operating effort, minimum wear, and ample thermal capacity to absorb heat from short-time rated currents (15,600 to 40,000 amp for a 600-amp switch, depending on conditions). Adjustments also should be non-critical and capable of being made with a hot stick, if required.

Pacific Types SW and SWA Pole Top Air Switches generously meet these exacting requirements, and what is more important—maintain these qualities through years of non-use or years of frequent switching, as the other extreme. Catalog 114 describes all features of these switches.

* Pacific is credited with having made the first commercially used tilting-insulator air switch; it was introduced 40 years ago.



Current flows from body of blade through two roller disks that revolve slightly at each switch operation. During opening the roller assembly moves outward one inch before contacts start to part—an aid to progressive fracturing of ice.

All contact surfaces are faced with thick solid-silver inserts.

PACIFIC ELECTRIC MFG. CORPORATION

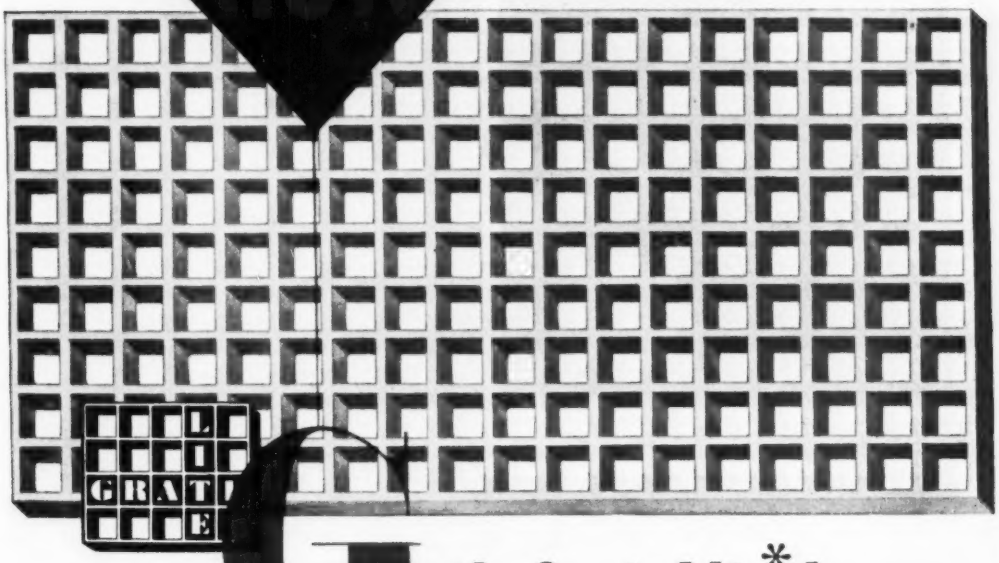
5815 THIRD STREET, SAN FRANCISCO 24, CALIFORNIA • 4500 HARRISON STREET, GARY 10, INDIANA

Since 1906

SALES OFFICES or AGENCIES in PRINCIPAL CITIES

new

OPEN LIKE A LATTICE
DIFFUSING LIKE GLASS



Guth GrateLite* Louvre

the latest idea in lighting

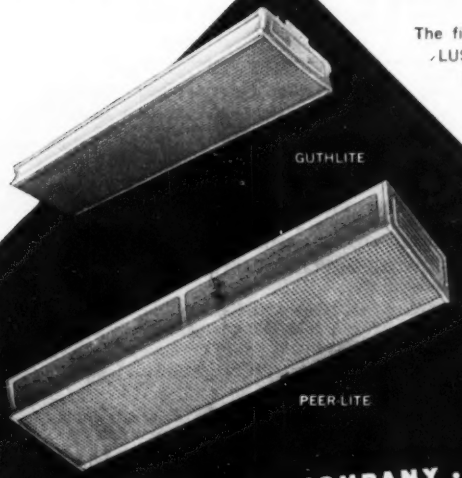
A SYMPHONY OF DIFFUSED LIGHT

* U. S. & Can. Pats. Pend.

The first integral plastic louvre for fluorescent lighting, molded of LUSTREX polystyrene. It reveals a new conception of architectural beauty and efficient lighting: Its diffusion results from the ⅜" cubical lattice that cuts off direct light at a 45° angle.

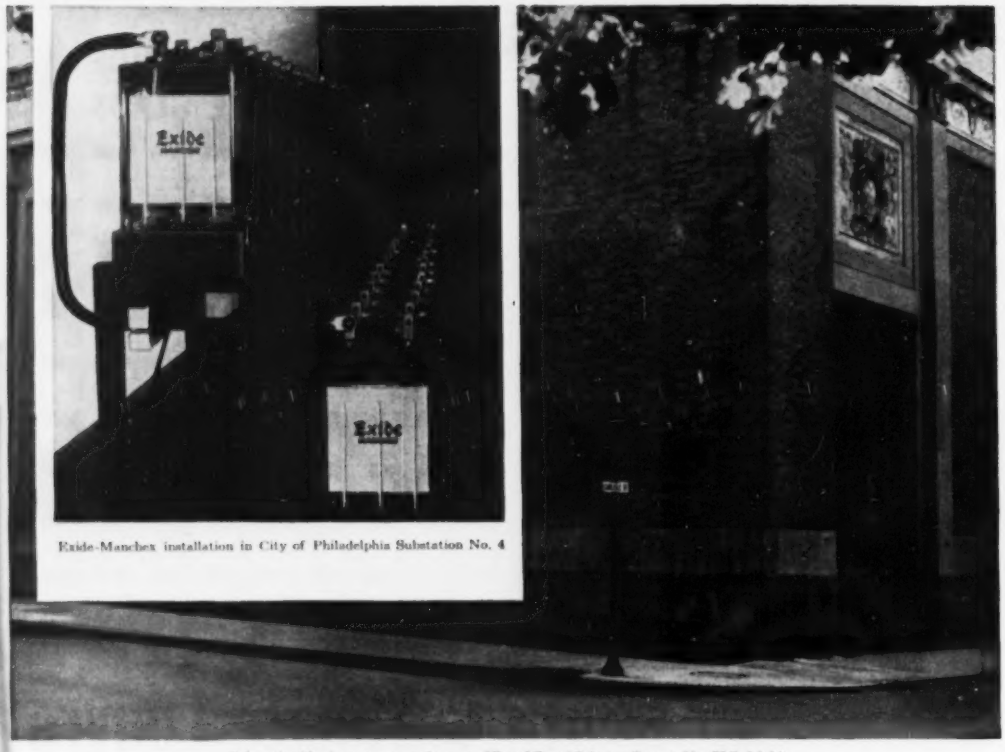
But words alone cannot describe beauty. See for yourself and ask to be shown a sample. It will give you a new outlook on lighting.

GrateLite is tough, quickly cleaned and de-staticized. It is furnished in one piece with Guth Fluorescent Fixtures.



GUTH'S GOLDEN YEAR
1952
Guth
...leaders in lighting since 1902

THE EDWIN F. GUTH COMPANY · ST. LOUIS 3, MO.



Exide-Manchex installation in City of Philadelphia Substation No. 4

Substation No. 4, power source for part of Broad Street Subway. Operated by Philadelphia Transportation Company, largest privately-owned, unified transit system in America.

"TRIPPING" ON THE BROAD STREET SUBWAY

Exide-Manchex BATTERIES

More than 90,000,000 passengers a year ride on Philadelphia's city-owned, PTC-operated Broad Street Subway. Directly, and through its many feeder lines, the subway serves a large part of the city and adjoining areas. Safety and service records are high. Equipment is modern, efficient . . . and includes dependable Exide-Manchex Batteries.

Power for the northern section of the subway is normally supplied from Substation No. 4 by three 3000-KW Rotaries. They receive current from the Philadelphia Electric Company, at 13.8-KV, over cables. The station's six, motor-operated oil circuit breakers and five D.C. solenoid-operated air breakers, are powered by Exide-Manchex Batteries, which also provide emergency lighting throughout the station.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto
"Exide" and "Manchex" *Reg. Trade-marks U. S. Pat. Off.*

EXIDE-MANCHEX BATTERIES ARE PREFERRED BY MANY UTILITIES BECAUSE THEY ASSURE:

POSITIVE OPERATION: Dependable performance at ample voltage with no switching failures.

INSTANTANEOUS POWER: High rates for switchgear operation with adequate reserve power for dependable performance of all other control circuits and for emergency lighting.

LOW OPERATING COST: Extremely low internal resistance.

LOW MAINTENANCE COSTS: Water required about twice a year. No change of chemical solution needed during life of battery.

LOW DEPRECIATION: Sturdy, long-life construction.

GREATER CAPACITY in a given amount of space avoids overcrowding of equipment.

These features combine to make Exide-Manchex *your best power buy* for all control and substation services.

1888 . . . DEPENDABLE BATTERIES FOR 64 YEARS . . . 1952

High-voltage capacitors now assembled in completely wired, factory-assembled stacking units

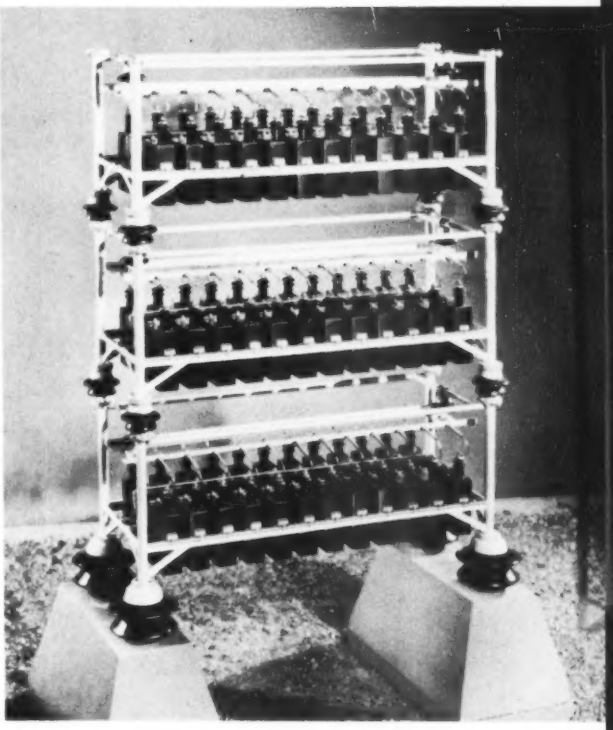
INSTALLED COST GREATLY REDUCED

The use of capacitors has long been accepted as the most economical means of improving voltage conditions and increasing circuit capacities. Now, Westinghouse offers a line of *standardized factory-assembled* capacitor stacking units from which can be selected the appropriate combination to achieve desired KVAR and voltage ratings. The result is a minimum of installation labor and expense.

The new outdoor capacitor stacking units can be arranged for service from 2,400 to 287,000 volts, through groups of standard rating units connected in series between line and neutral. The capacity will depend on the number of units in parallel per group. Unit construction provides the important advantages of low-cost installation, plus easy reconversion for other voltages . . . and you can stack them up to four units high.

Long maintenance-free life of the complete unit is assured by hot-dip galvanizing of the steel framework *after assembly*. The zinc-spray finish of the capacitor units eliminates any need for periodic painting.

For complete information, write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.



Typical Westinghouse high-voltage capacitor bank. Each of the three stacking units is completely assembled and wired, and shipped ready for installation.

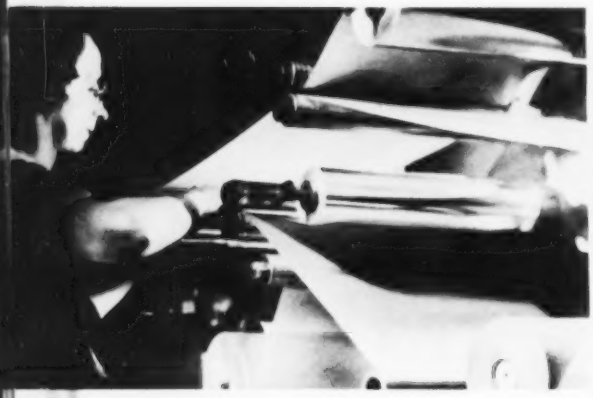
YOU CAN BE SURE... IF IT'S

Westinghouse

INERTEEN CAPACITORS

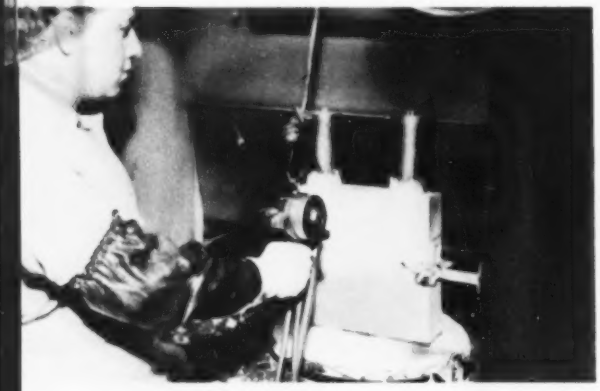
Better service, greater savings . . . result from these design and construction features

The steady reduction in Westinghouse capacitor price is supplemented by the large savings realized from lower installation and maintenance costs. Westinghouse Inerteen* Capacitors have compiled an enviable record of long-life, trouble-free service. These features are typical of the way Westinghouse engineering keeps your costs low.

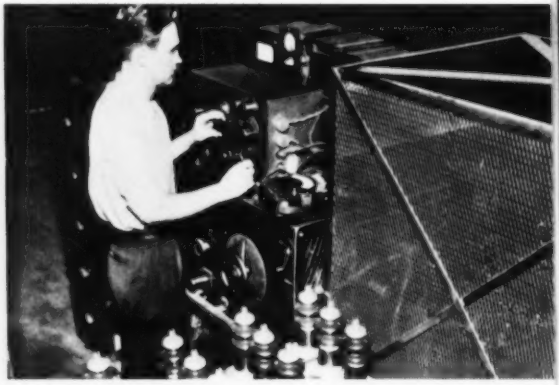


Inertex paper dielectric—Inertex is a special Westinghouse capacitor paper of highly purified wood cellulose. It is rigidly inspected for conducting particles, and physical, chemical and electrical characteristics. Non-inflammable Inerteen is used for impregnation.

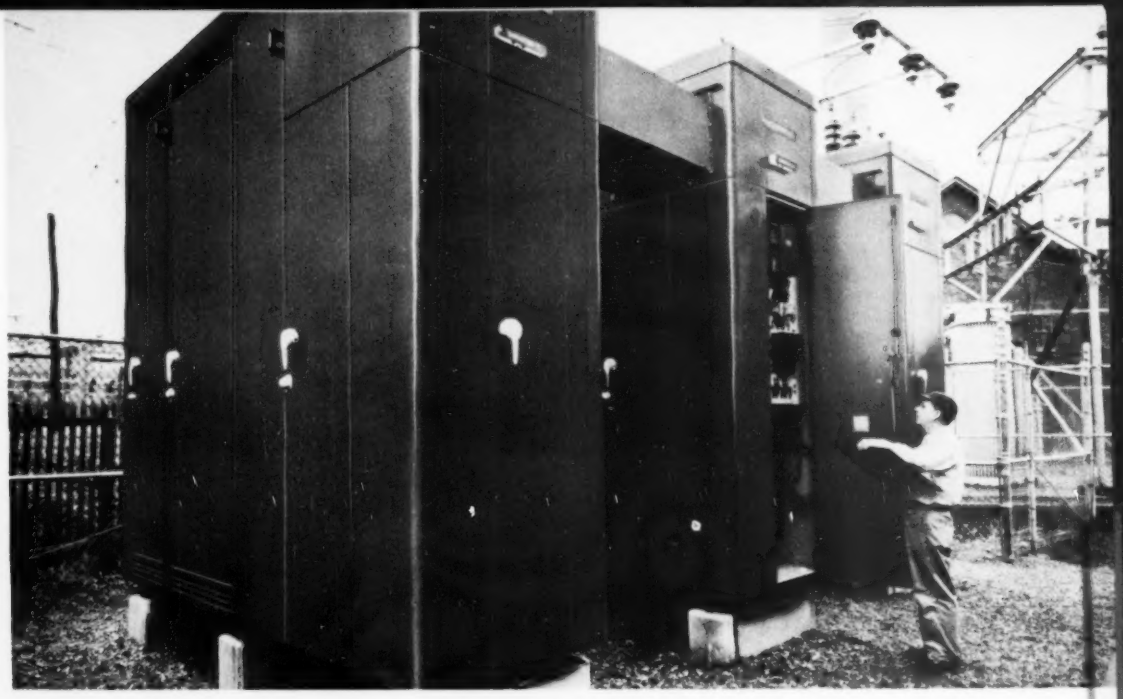
Hermetically-sealed units—Solder-sealed terminal bushings eliminate compression gaskets, give positive protection against leaks or contamination of the dielectric assembly.



Zinc-spray finish—A tough zinc coating, many times the thickness of normal hot-dip galvanizing, gives effective protection against rust and atmospheric corrosion, provides strong resistance to abrasion.



Testing—All known operating conditions are included in performance tests given to every Inerteen Capacitor. Electrical tests assure losses of not more than ⅓ of 1% . . . full kvar at rated voltage and frequency. Pressure tests insure leakproof construction.



For system voltage control from large substation banks . . . Westinghouse completely enclosed capacitor equipments

Westinghouse metal-enclosed capacitor equipments are used primarily in large substation banks to control voltage levels and reactive power flow over whole systems. This 13.8-kv 3-phase unit includes capacitors, circuit breakers and grounding switches for complete automatic or manual control. Available in a voltage range of 230 to 34,500 volts. They offer these built-in time and money-saving advantages:

Factory-assembled enclosures—Low installation costs follow from simple foundation requirements, easy connections.

Completely self-contained—Up to 13.8 kv, they are integral operating units, and require *no* external accessories.

Complete safety—Safety to personnel and equipment is assured by fully interlocked system of grounding control. Completely encased in steel.

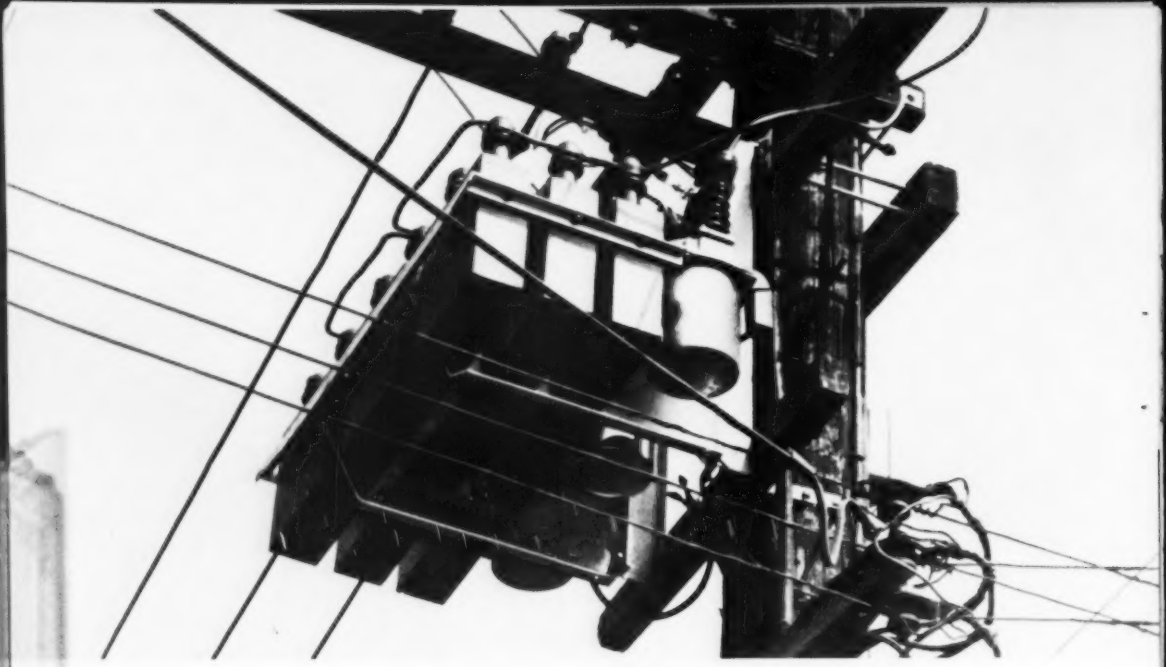
Compact structure—Minimum floor space required.

Wide flexibility—Roof bushings, throat, or pothead connections provide for easy installation. Easily moved to new location.

•

Westinghouse Enclosed Capacitor Equipments are available with automatic control, where operating conditions require. For more information on how you can increase pay loads with Westinghouse capacitors, contact your local representative, or write for Booklet D.B.49-220. Address: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

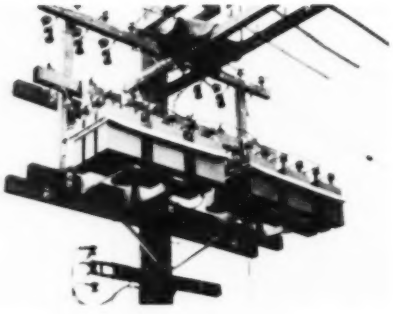
YOU CAN BE **SURE**...IF IT'S Westinghouse



Automatically switched Autotrol* brings low-cost capacitor equipment to distribution circuits

Westinghouse Open-Type Autotrol turns power-factor losses into profitable pay-load capacity . . . at a cost as low as $5.66 per kvar. Compact, lightweight Autotrol units are completely factory assembled and wired . . . installation is simple and inexpensive. You just hoist, bolt and connect! Available for 225 and 300 kvar, Autotrol answers your need for "on-the-spot" switched power-factor improvement at any point on your distribution system.

Your Westinghouse representative has more complete information on the savings you can effect. Or write for Booklet D.B. 49-510. Address: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60796

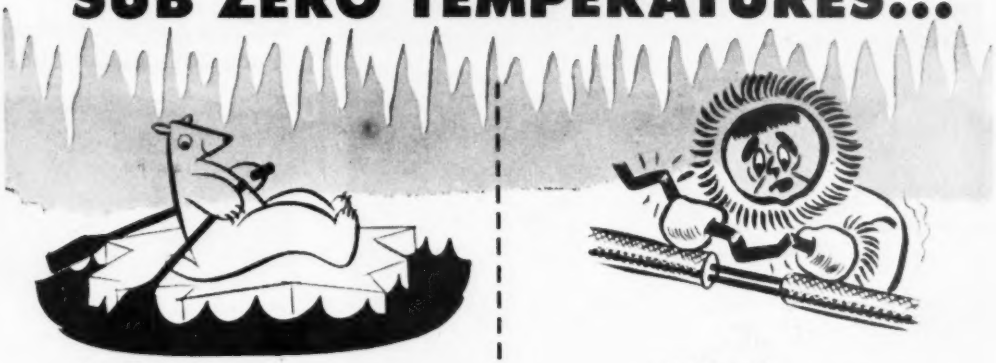


YOU CAN BE SURE...IF IT'S
Westinghouse

INERTEEN CAPACITORS

*Trade-mark

SUB ZERO TEMPERATURES...



PERFECT for Polar Bears

TOUGH on Tapes

It's never too cold for

*BI-SEAL® SELF-BONDING INSULATING TAPE

Wrap it . . . twist it . . . stretch it! Even at temperatures as low as 40° below zero, Bi-Seal still retains its extreme flexibility and remarkable self-bonding characteristics. It's the answer to your cold-weather wire and cable splicing problems . . . an easy-to-apply, permanent electrical insulation and moisture-seal that is completely impervious to weathering.

This tested and proven multi-purpose electrical insulating tape is unaffected by acids, sunlight, corrosion, ozone and fungus. It has an average dielectric strength of over 1000 volts per mil and will perform effectively with any type of insulation. It can be stored indefinitely without deforming or deteriorating.

Don't wait . . . head off your cold weather splicing problems NOW! Send for full details today!

OTHER ADVANTAGES OF BI-SEAL

- NO STICKY ADHESIVES . . . EASIER TO APPLY IN CLOSE CLEARANCES
- NO RIGHT OR WRONG SIDE . . . BOTH SIDES USABLE
- NO TACKY SURFACE TO PICK UP DUST OR FOREIGN MATTER
- WILL NOT TANGLE OR STICK TOGETHER DURING APPLICATION
- REQUIRES NO SPECIAL APPLICATION TECHNIQUES
- CAN BE STORED INDEFINITELY

* POLYETHYLENE BASED COMPOUND

Attach this coupon to your company letterhead and mail to: **Bishop Manufacturing Corporation, Dept. EW, Cedar Grove, N. J.**
Please send sample and complete information on Bi-Seal to:

Name_____ Title_____
Company_____
Address_____
City_____ Zone____ State_____

BI-SEAL — APPLIES FAST · STAYS FAST

BISHOP
MANUFACTURING CORPORATION
CEDAR GROVE, NEW JERSEY

Machines may be installed or moved without rewiring or power shutdown. Machine is simply positioned, then tapped into live power by inserting protective plug into convenient opening in BUStribution DUCT.

Tap live power anywhere along BUStribution DUCT.

1. Choose location in duct.

Duct has regularly spaced, crescent-shaped openings on *both sides*, on average 10" centers. This permits spacing of plugs close to machine locations; gives better current density distribution on bus bars; obtains uniform and better heat dissipation between bus bars and casing. Plug-In openings are covered by embossed plates swiveled to casing on rivets which permit covers to be rotated through 180 degrees.

2. Connect machine and engage Bus Plug.

Crescent shape of Plug-In openings assures proper polarization of the Plug-In devices. Plug contact fingers are staggered so that plug may be inserted in openings in only one way. The steel side channels of the plug provide a means of grounding for greater safety, and supply support until plugs are bolted to duct. Bus bars and plugs' current-carrying parts are silvered, assuring perfect connections.

Less down-time for power buyers with BullDog Plug-in BUStribution

With BullDog Plug-in BUStribution DUCT, the power on a production line can stay on at all times. Even if part or nearly all of the electrical equipment on a line needs a changeover, new set-up, or repairs, the rest of the line can keep rolling.

For your customer – production continues smoothly, with no idle men or machines. What's more, it's easy to install BullDog Plug-in BUStribution DUCT. Parts are factory-built, need not be cut, threaded, or bent.

Plug-in BUStribution DUCT is just one of many famed BullDog electrical products. If any of your customers have an electrical distribution problem, BullDog will gladly aid you in finding the best answer.

Let BullDog help you promote the use of more electrically powered machines in your customers' plants. Call in a BullDog Field Engineer or write direct for free literature. For full information about Plug-in BUStribution DUCT, write for free Bulletin D-755.

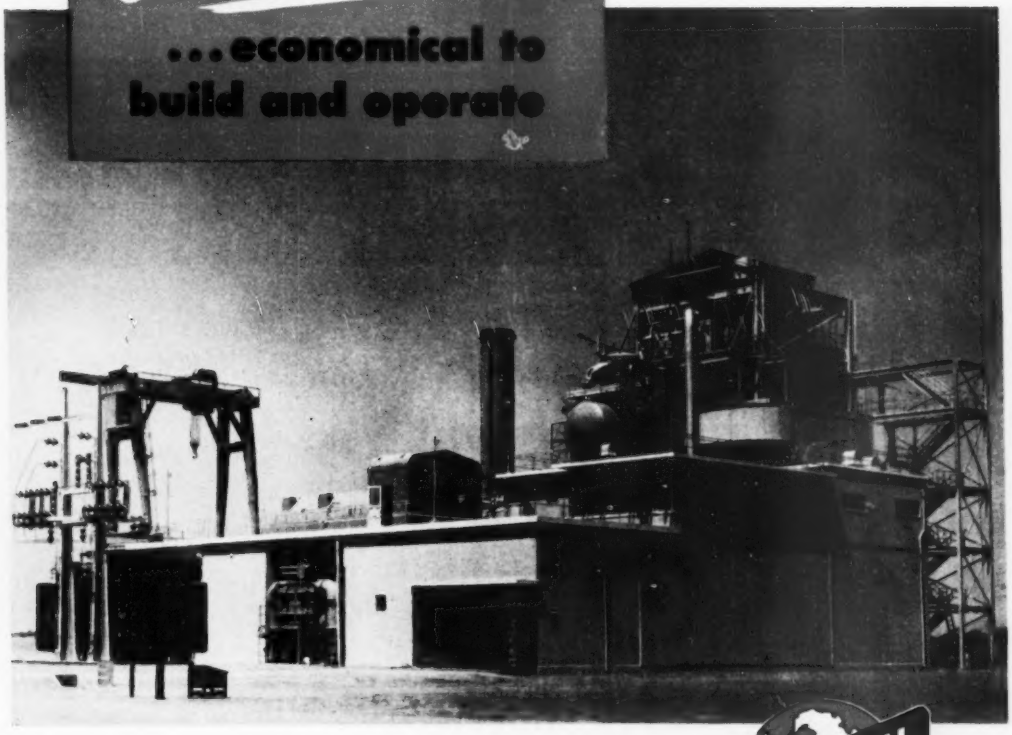
BULLDOG

BULLDOG ELECTRIC PRODUCTS COMPANY
DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES
IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO
PIONEERS IN FLEXIBLE ELECTRICAL DISTRIBUTION SYSTEMS

1902-1952 . . . SERVING INDUSTRY FOR 50 YEARS WITH FINER ELECTRICAL PRODUCTS

"OUTDOORS"

...economical to build and operate



Kyrene Plant of the
SALT RIVER POWER DISTRICT
Phoenix, Arizona

Pace-setting a sound trend in steam plant design, Bechtel engineers laid out this compact new 30,000 K. W. plant with a minimum of costly, covering structure. Turbo-generators and boilers are located outdoors; large auxiliaries are economically protected. Provision was made for operating the plant with a small staff... combining economy of operation with economy of initial cost.

Bechtel is now designing and building a 60,000 K. W. addition to this plant.

BECHTEL

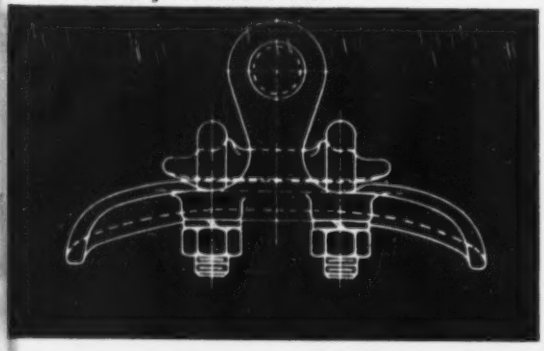
BECHTEL CORPORATION

BUILDERS FOR INDUSTRY

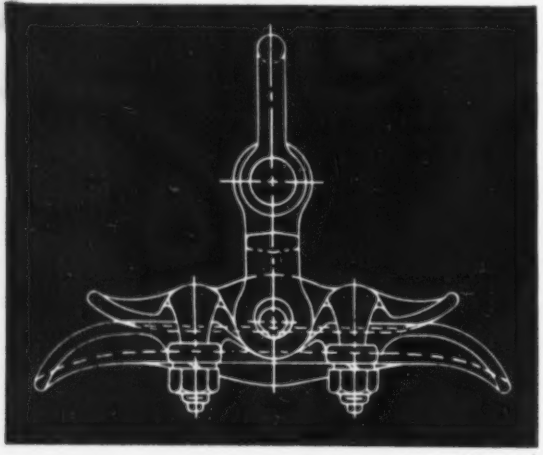
Los Angeles
SAN FRANCISCO · *New York*

TIE LINE IN

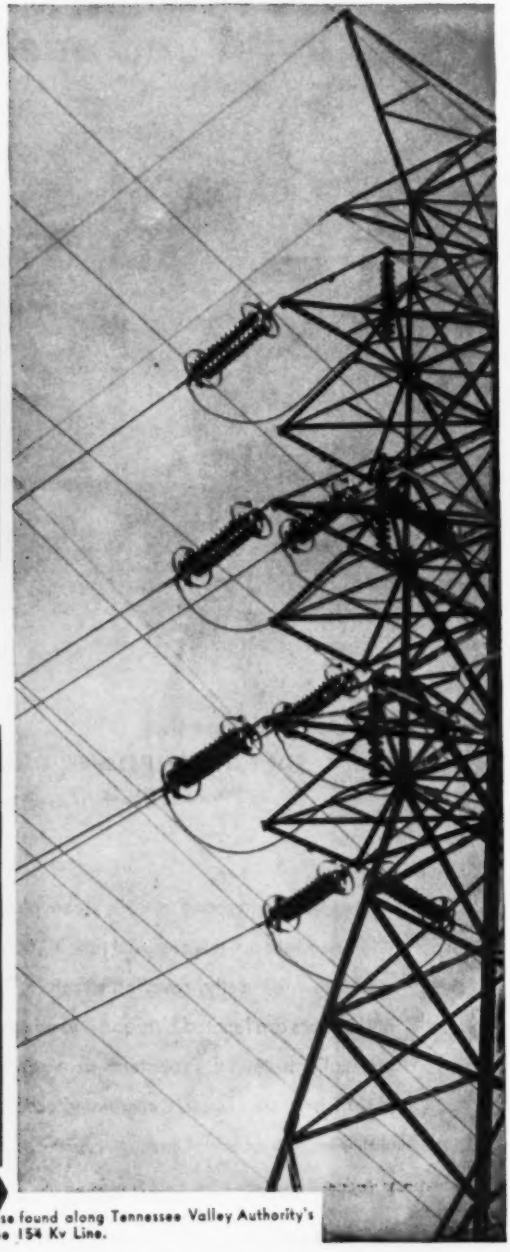
THIS 154 Kv line crosses rolling country and mountainous terrain to connect Tennessee Valley Authority's Chickamauga Dam with its Hiwassee Dam 65 miles away. Constructed in 1940, the line later was looped into Apalachia Dam and Cleveland Primary Sub-station bringing its overall length to some 70 miles.



Serving as a tie between hydro-electric plants, this TVA line employs 636,000 cm A.C.S.R. Conductor under 9000 lbs. tension, 7/16" H.S. Steel Ground Wires at 6000 lbs., 1400 ft. spans, 1/2" ice and 8 lbs. wind at 0° F. BTC Drop Forged Steel Clamps and Transmission Line Hardware were installed when the line was erected.

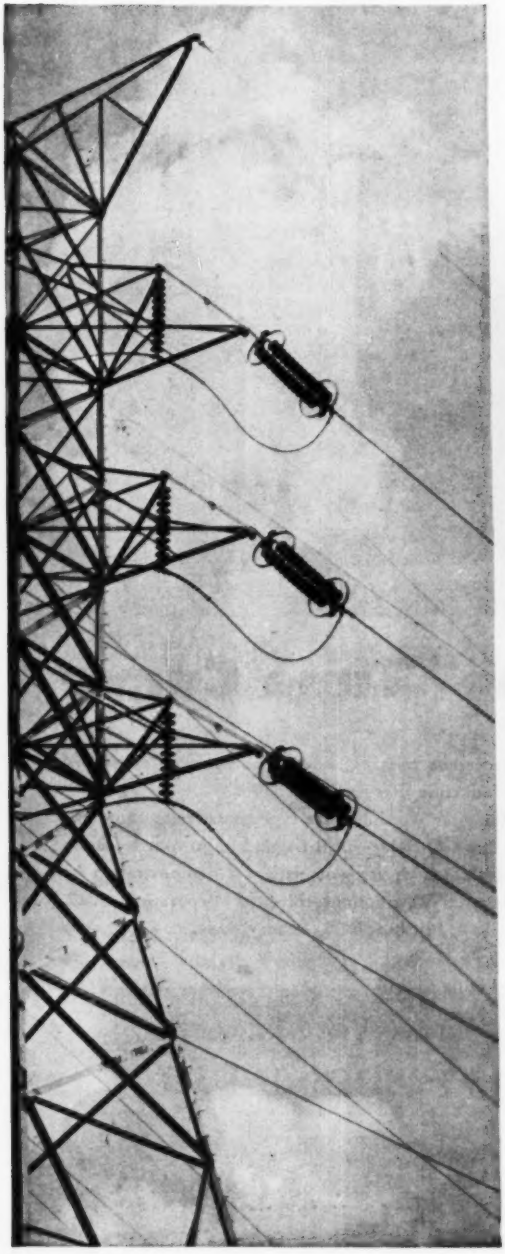


TYPICAL 90° TOWER

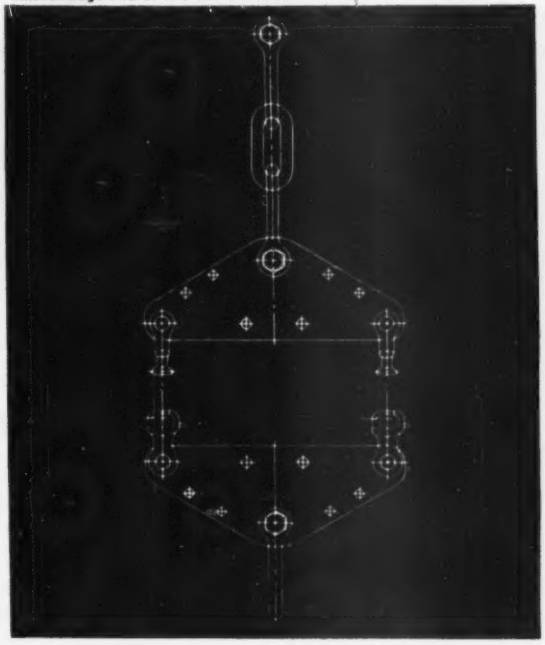


• This double circuit dead end 90° angle tower is typical of those found along Tennessee Valley Authority's Chickamauga-Hiwassee 154 Kv Line.

TENNESSEE



● **END OF THE LINE** BTC Insulator Hardware, shown here, is installed on a double circuit dead end tower, located near the Chickamauga end of this 154 Kv. line.



Why not specify BTC Drop Forged Clamps and Fittings for all your transmission line projects? You'll find — as so many utilities and construction firms already have found — that BTC Clamps and Fittings are easier to install, give efficient trouble-free performance and help keep maintenance at a minimum.

Sold Through Your Insulator Manufacturer Only.

Drop Forged BTC Hi-Line Hardware

The BREWER-TITCHENER Corporation

Cortland · New York

Another Westinghouse Relay Development

New CO Relay

The Type CO Overcurrent Relay is available in Flexitest or standard rectangular projection case.

has a "Two-in-One" Time Curve

One relay now gives you two time curves. Inverse and very inverse relays are identical except for calibration and may be changed from one curve to the other (or intermediate curve) simply by changing the calibration adjustment—a new high in protective relaying flexibility.

The CO Relay also offers superior performance in accuracy. Its new "E" element has four independent adjustments to assure accuracy over the entire operating range.

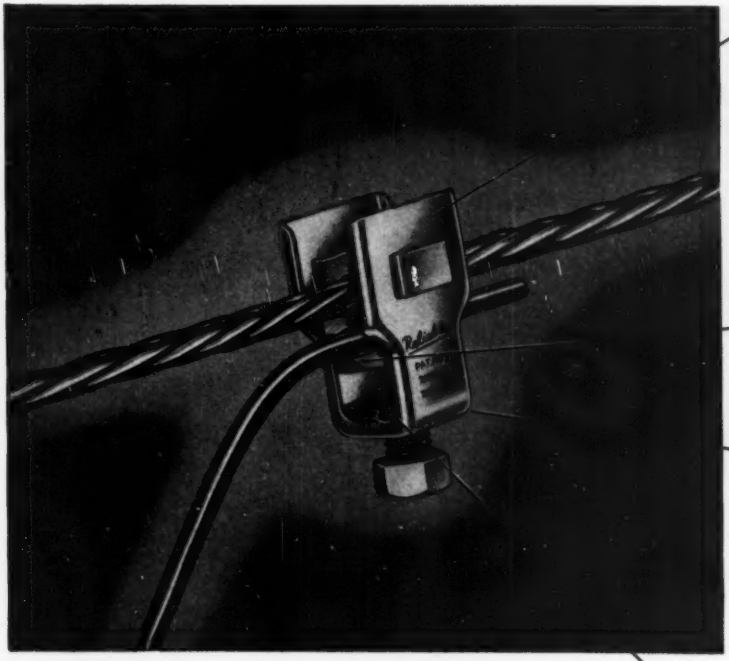
Flexibility, accuracy and reliability combine in the new CO Relay to represent the greatest advance in overcurrent relaying since Westinghouse developed the induction disc relay.

Ask your Westinghouse representative to show you the new CO Relay—he'll be glad to go over it feature by feature with you—or request a demonstration by writing to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-40409

YOU CAN BE SURE...IF IT'S Westinghouse

RELAYS

Accents on Accuracy



in Aluminum to Aluminum and
Aluminum to Copper Connections

FLIP-ON TAP CLAMPS

(over six million now in service)

Accurately gaged threads and spacers always work smoothly – snug-up tighter, then stay tight–while large bearing surfaces protect the conductors from damage. All parts are accurately heat treated. Their lighter construction of aluminum alloy reduces vibration fatigue. Where dissimilar conductors are used, thick aluminum spacers are copper faced for best protection against corrosion. Spacers accurately align conductors under screw pressure so that the joint gets the full benefit of direct (1:1 ratio) pressure. Reliable's accent on accuracy assures quick and easy installations – – – rugged, Reliable performance.

Reliable ELECTRIC COMPANY

3145 CARROLL AVENUE, CHICAGO 12, ILLINOIS

OVER 45 YEARS OF SERVICE TO THE UTILITIES

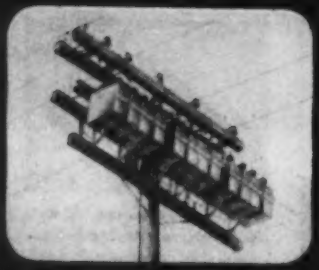
1. Precision dies and faultless equipment produce rugged body — wall slots are accurately parallel for easy, reliable pressure-clamping.

2. Exact manufacturing techniques assure these carefully engineered spacers give firm, reliable connections — without damaging conductors.

3. Nut is staked in body before tapping. Four full threads are continuous. Aligning fixture insures accuracy of direction. Pressure on conductors is directly under screw in opposite directions (ratio 1:1).

4. Accurately controlled electric furnaces bake long life and reliability into this tough aluminum alloy.

POWER-LINE CONNECTORS
AND
CONSTRUCTION SPECIALTIES



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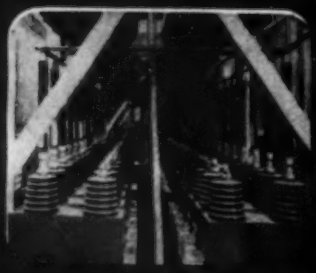

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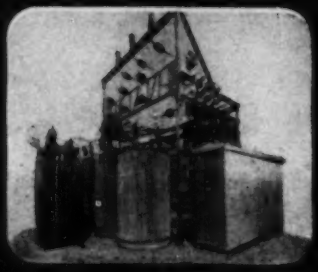

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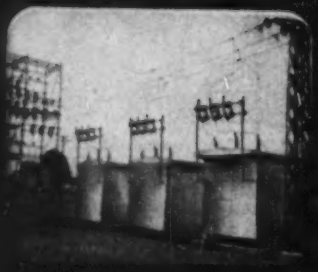

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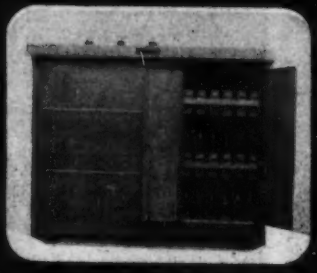

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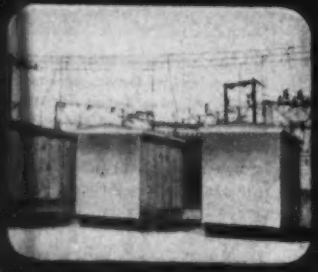

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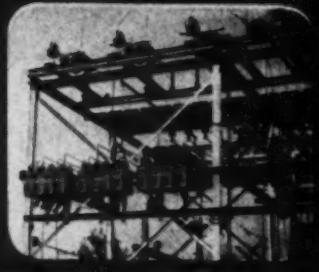

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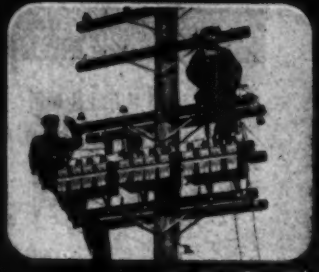

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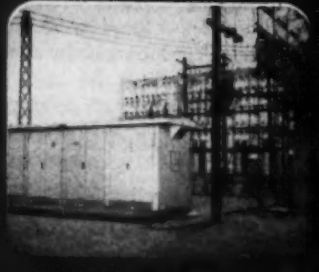

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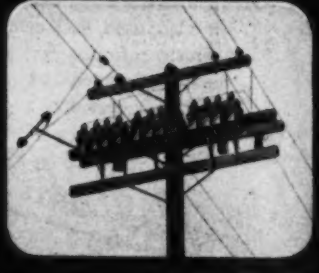

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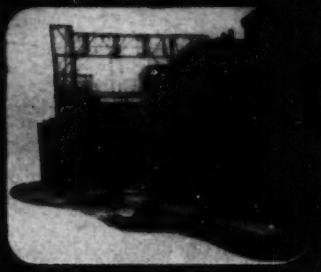

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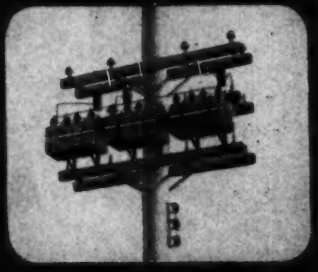

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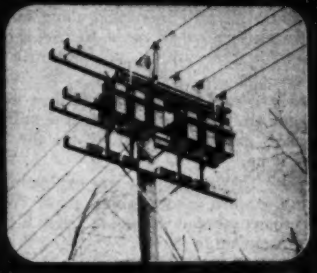

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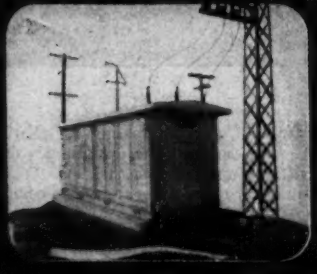


1946

the Years write an impressive testimonial to Cornell-Dubilier Capacitors

You will find them in the stations and on the poles of the country's largest power producers: C-D capacitors that have been in continuous operation since 1938, 1939, 1940 with *little or no maintenance required!* Over 4,000 time-tested C-D installations confirm that this is truly the most *consistently dependable* capacitor for power-factor improvement.

C-D gives you these extra safety factors

- C-D capacitors are designed to withstand transient over-voltages as well as steady state voltages. Low dielectric unit stress provides this extra margin of safety.
- Heavy major insulation in the form of laminated liners with reinforced corners, insures highest impulse withstand levels.
- Only C-D capacitors (from 230 to 13,800 volts), are subjected to a full rated voltage energization test.
- Wide margin between paper and foil provides higher insulation level.
- Use of C-D's Dykanol results in lower unit weight per KVAR; high stability; long life.
- Heavy-Duty wet process porcelain bushings for longer creepage path, less breakage, higher impulse rating.

Planning an installation of industrial, station or pole-type capacitors for power-factor improvement? You can save maintenance dollars and insure trouble-free service by talking it over with a C-D engineer. Cornell-Dubilier Electric Corp., Dept. 9-112-8, South Plainfield, N. J.

CONSISTENTLY DEPENDABLE

CORNELL DUBILIER

CAPACITORS

PLANTS IN SOUTH PLAINFIELD, N. J., NEW BEDFORD, WORCESTER, AND CAMBRIDGE, MASS., PROVIDENCE, R. I., INDIANAPOLIS, IND., FUQUAY SPRINGS, N. C., AND SUBSIDIARY, THE RADIART CORP., CLEVELAND, OHIO

STRAIT JACKET FOR A FIREBUG

When rural electrification came along, farmers found themselves with the most useful of all servants . . . electricity . . . but with it a *big* headache.

The barn wire available at the time wasn't good enough. Moisture in barns was—still is—excessive, and the insulation on the wire soaked it up.

Result? The bare copper was exposed in an incredibly short time. Then poof! When wires crossed, there was trouble. Often lifetime savings went up in flames.

National Electric met the situation with a *new* idea, a new wire insulated and sheathed with Neoprene. The firebug found itself in a strait jacket. Farmers breathed easier.

It isn't a new experience for National Electric to pioneer with a revolutionary development. National Electric has led the electrical industry many times . . . a good company to know.

EVERYTHING IN WIRING POINTS TO

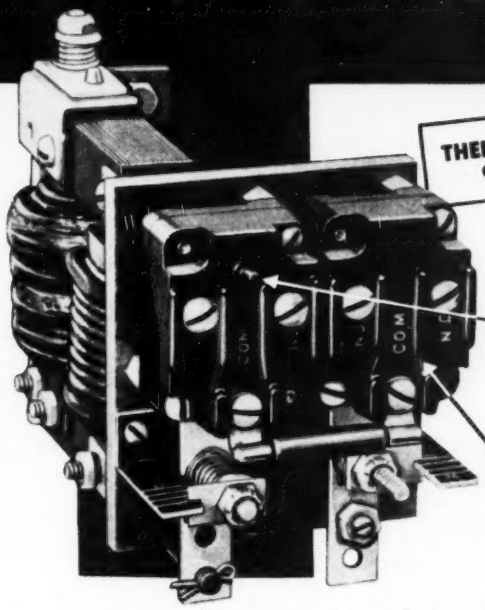
National Electric Products

PITTSBURGH, PA.

3 Plants • 7 Warehouses • 42 Sales Offices

World's largest manufacturer of a complete line of electrical roughing-in materials

your best buy for protecting MOTORS and MOTOR CIRCUITS



THERMAL-MAGNETIC Overload Relays

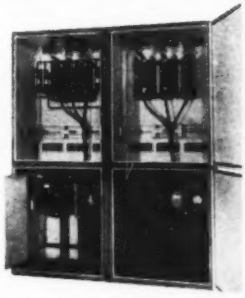
Red-nosed indicator for re-setting instantaneous-trip contacts

Thermal-trip contacts

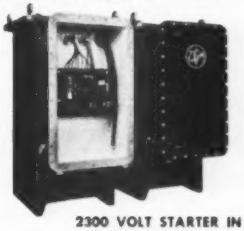
you save more by continuity of service with EC&M Starters and new Thermal-Magnetic Overload Relays

THESE ADVANTAGES PAY-OFF ON ESSENTIAL DRIVES

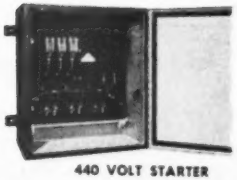
1. No dashpots.
2. Motor operating-current electrically connected to tripping-element for quick response—for positive response.
3. Low current-setting for running protection without fear of false-trips during starting.
4. Red-nosed indicator and independent trips are time-savers on an outage.
5. Short reset time—15 to 20 seconds.
6. These new Type ZTM Overload Relays are available on all EC&M Starters. On systems where fault capabilities are large, investigate high interrupting capacity starters which eliminate the need for fused or circuit breaker protection.



2300 VOLT CUBICLE TYPE STARTERS



2300 VOLT STARTER IN TYPE VIII ENCLOSURE



440 VOLT STARTER

●Write for Bulletin 1180-351

THE ELECTRIC CONTROLLER & MFG. CO.

2698 EAST 79TH STREET ★ CLEVELAND 4, OHIO

COPE Cable Trough is Used by Utilities and Industrial Plants Throughout the World

The ease and economy of installing standard COPE Cable Trough has given it wide acceptance among the leading utilities and industrial plants around the globe. They realize, as will you, how COPE Cable Trough saves on time, material and costs.

Write for full information.

COPE Cable Trough Installation at Gary Sheet & Tin Mill—U. S. Steel Company

A few of the Users of COPE CABLE TROUGH . . .

Allis-Chalmers Manufacturing Co.
Aluminum Company of America
Atlantic City Electric Co.
Atomic Energy Commission
Borg-Warner Corp.
The Budd Company
Carolina Power & Light Co.
Central Hudson Gas & Electric Corp.
Cincinnati Gas & Electric Co.
Cleveland Electric Illuminating Co.
Commonwealth Edison Co.
Connecticut Light & Power Co.
Consolidated Gas, Electric Light & Power Co. of Baltimore
Delaware Power & Light Co.
Detroit Edison Co.
Detroit Steel Corp.
Dow Chemical Co.
E. I. du Pont de Nemours & Co., Inc.
Ethyl Corporation
Ford Motor Company
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Island of Iceland
Jersey Central Power & Light Co.
Jones & Laughlin Steel Corp.
Kaiser Aluminum & Chemical Corp.
Kansas City Power & Light Co.
Kingdom of Egypt
Kingdom of Greece
The Mead Corporation
Monsanto Chemical Co.
Monongahela Power Co. and The Potomac Edison Co.
National Advisory Committee for Aeronautics
National Aniline Div., Allied Chemical & Dye Corp.
New England Electric System
New York State Electric & Gas Corp.
Niagara-Mohawk Power Corp.
Pacific Gas & Electric Co.
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Reynolds Metals Co., Inc.
Southern California Edison Co.
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United States Bureau of Reclamation
United States Navy
United States Steel Co.
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T.J. Cope INC.

T. J. COPE, INC., 711 SOUTH 50th ST.
PHILADELPHIA 43, PENNSYLVANIA

You know Cope by these products

MINERAL IMPURITIES

REDUCED TO VANISHING POINT

WITH PERMUTIT AUTOMATICALLY REGENERATED MIXED BED DEMINERALIZER

DELIVERS WATER PURER THAN ASTM REQUIREMENTS FOR REAGENT WATER*

Reduction of electrolytes to less than 0.1 ppm and silica to less than 0.01 ppm can be obtained. In actual practice, specific resistance higher than 20 million ohms-cm. has been achieved. Purity of Permutit Mixed Bed Demineralized water is much higher than ASTM requirements for Reagent Water. In comparison, most commercial distilled water contains from 2 to 10 ppm electrolytes. Yet the cost of distillation far exceeds that of Mixed Bed Demineralizing for most normal water supplies, and uses equipment that takes up far more valuable space.

*Tentative specifications for Reagent Water, ASTM designation D-1193-51T.

Automatic Regeneration makes the Permutit Mixed Bed Demineralizer virtually foolproof! It provides positive control, eliminates the dangers of costly human errors and saves the many man-hours required for manual regeneration.

Mineral impurities are reduced to the vanishing point! The effluent of the Permutit Automatically Regenerated Mixed Bed Demineralizer is so pure that conventional analysis methods cannot accurately determine its residual mineral content.

Two amazing ion exchange resins—Permutit Q and Permutit S—do a complete job of demineralization and silica-removal in a single stage. An almost infinite number of separate ion exchange steps take place simultaneously in the homogeneous bed of anion and cation exchangers.

New Booklet on Demineralization with Silica Removal by Ion Exchange

This interesting new bulletin describes key ion exchange methods for demineralizing water and removing silica.

For your copy, write to THE PERMUTIT COMPANY, DEPT. EW-11, 330 WEST 42ND ST., NEW YORK 36, N. Y. or to Permutit Company of Canada, 6975 Jeanne Mance St., Montreal.

PERMUTIT

The sole manufacturer of all types of cation and anion exchangers and equipment

ION EXCHANGE AND WATER CONDITIONING HEADQUARTERS

WHEN ORDERING
HIGH VOLTAGE
CABLE SPLICING
MATERIALS SEPARATELY . . .

you're Wasting Time

. . . IF YOU GO
THROUGH ALL OF
THESE STEPS WHEN
ONE WILL DO

THE G & W SPLICING KIT *is the* TIME SAVING WAY

Simply give us complete cable data and you receive a neat package with adequate quantities of all materials for a properly designed joint.

You save time and money because . . .

No lengthy material specifications are necessary.

Both design and installation methods can be standardized.

All joints are properly designed to industry standards by expert cable engineers.

All splicing materials are purchased from one source.

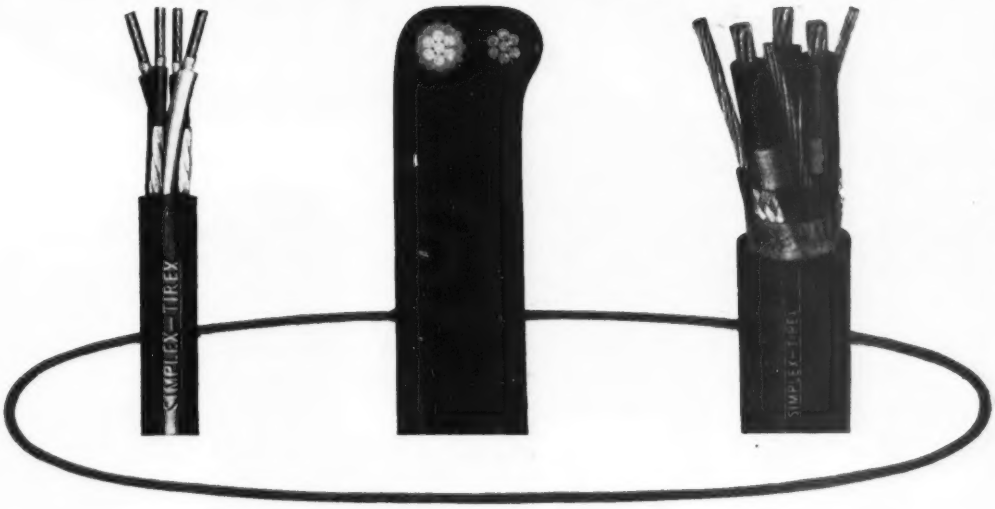
Each kit packed in convenient size box. Easy to store, identify and handle.

Individual kits issued directly to workmen in original shipping cartons.

Easy to quickly estimate costs for any particular job.

G&W ELECTRIC SPECIALTY COMPANY
7780 DANTE AVENUE • CHICAGO 19, ILLINOIS, U.S.A.
Representatives in principal cities in Canada, Powerlite Devices, Ltd., Toronto

TIREX IS A FAMILY



To a great many people the name "TIREX" means a small, flexible, long-wearing portable cord. Actually, TIREX is the name of a family of portable cords and cables. The family ranges in size from a single conductor #18 cord, all the way up to a 3-conductor Type SH-D cable for voltages in excess of 10,000 V.W.P.

TIREX cords are made in sizes from 18 to 10, from single to eight conductors in Type SO, and from two to four conductors in Type SJO. There are TIREX Mine Cords, as well as heavy duty shielded cords.

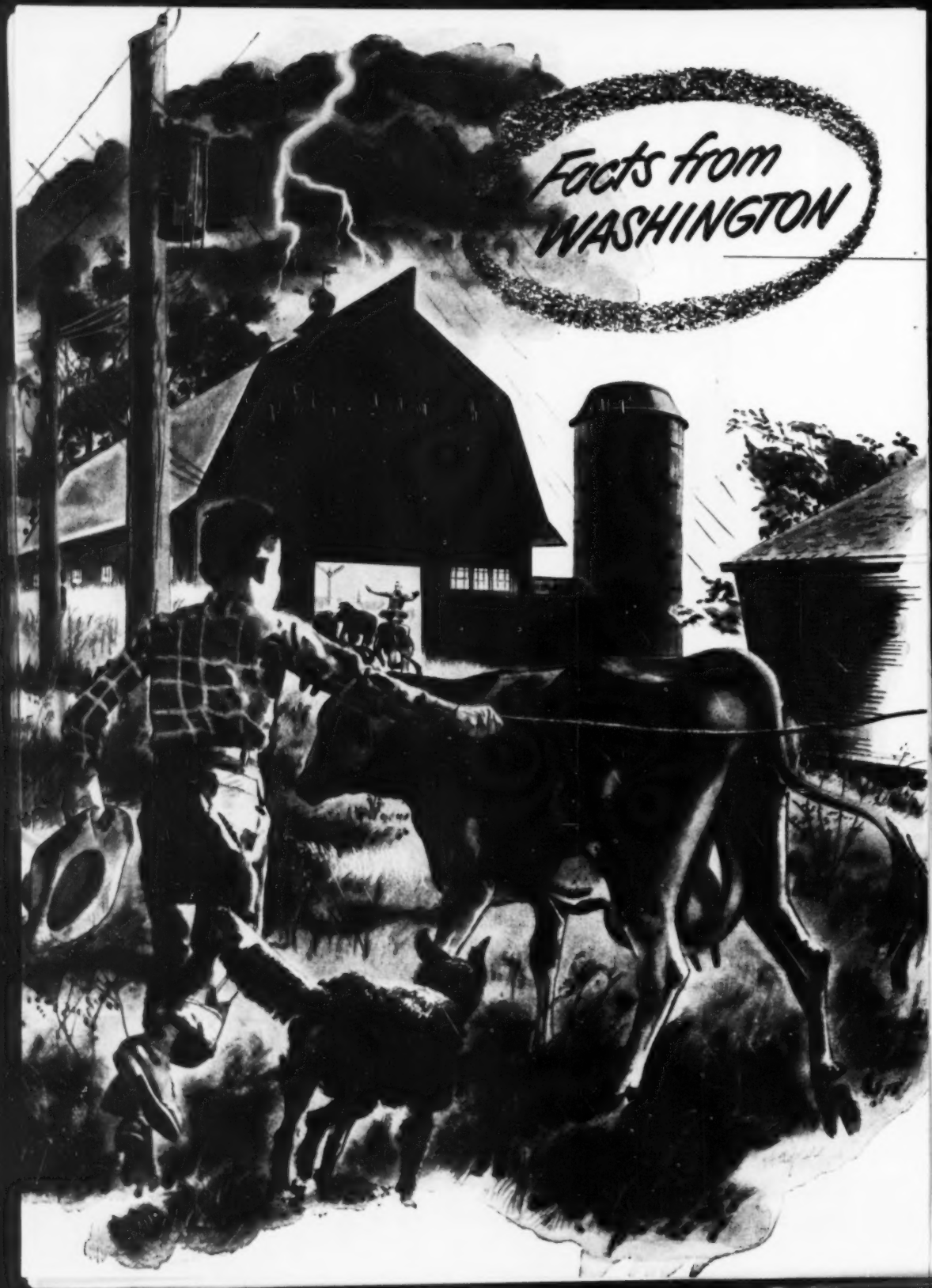
In the cable field there are single and multi-conductor cables, shielded or unshielded, Types W or G, SH-A, SH-B, SH-C and SH-D.

Your local distributor has many of the TIREX cords and some of the TIREX cables in stock. He can get most of the other stock type TIREX cords and cables for you in a comparatively short time. Be sure to see your local distributor whenever you need portable cords and cables.

SIMPLEX-TIREX IS A PRODUCT OF SIMPLEX RESEARCH

SIMPLEX-TIREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.


Facts from
WASHINGTON

"Single 'CSP' Transformer saves us $59.20 per year"

"One 'CSP' transformer is saving us an average of eight service calls a year —at a cost of at least $7.40 per trip," reports a utility in Washington State.

"In a rather inaccessible location, we had a conventional distribution transformer at the end of a rural line. Ten years' experience indicated that it cost us an average of $59.20 per year to maintain service at this troublesome spot. In addition, each outage averaged over two hours' duration . . . a cause of considerable customer irritation.

"Three years ago we replaced it with a 'CSP' transformer. Soon afterward a severe electrical storm damaged 18 conventional transformers in the same area, but left the 'CSP' transformer untouched in the location that had been the worst offender. To date this 'CSP' transformer has not had a single 'outage'."

Installation and maintenance costs for Westinghouse "CSP" (Completely Self-Protecting) Transformers are always lower, because complete protective equipment is built in, not separately mounted. A two-year survey of Electric Light and Power Companies shows the following: J-70595

NATIONAL AVERAGES

	"CSP"	Conventional
Installation Costs	$13.87	$24.74
Burn-out Rate	0.257%	1.005%
Fuse Outages	None	5.64% @ $6.52 per outage
Load Checks	Automatic	12.8%
Breaker Reset	1.02%	None

If you'd like to check your own costs against these national averages, ask your Westinghouse representative for Booklet 4-247-B, "Transformer Costs and Their Relation to Profits", Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

"CSP" devices . . . originated and patented by Westinghouse

YOU CAN BE SURE.. IF IT'S
Westinghouse
"CSP" DISTRIBUTION TRANSFORMERS

1873 THOMAS INSULATORS our 79th year RELIABILITY 1952

DEMAND *Proof* OF PERFORMANCE

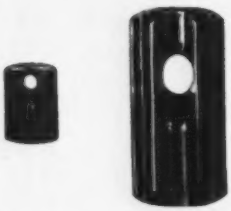
1907

● Fig. 1—In 1907, THOMAS was FIRST with the CAP-AND-PIN Suspension Insulator.

1952

● Fig. 2—In 1952, THOMAS is STILL the Standard of Comparison.

● Fig. 3—Typical "Quiet-Type" Insulator*.



● Fig. 4—Guy-Strain Insulators

Let us repeat, "All insulators are not alike". To make an insulator that will do its job the trouble-free way . . . over a span of many years . . . requires EXPERIENCE. Thomas has that experience.

Since the beginning of the Electrical Industry, Thomas has consistently kept pace with the Industry's astonishing growth. Two early mileposts in our progress come to mind.

In 1893, all of the porcelains used in the lighting arrangement for the World's Fair at Chicago were Thomas.

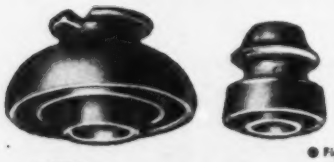
In 1907, Thomas designed and made the first Cap-and-Pin Suspension Insulator. UNITS INSTALLED THAT YEAR ARE STILL GIVING TROUBLE-FREE SERVICE AFTER 45 YEARS OF CONTINUOUS OPERATION.

More recently, Thomas pioneered and patented a complete line of "Quiet-Type"* Insulators which are guaranteed to eliminate insulator radio interference.

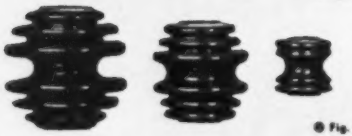
These are among the many Thomas "Firsts" and contributions which have helped the Electrical Industry reach its present position.

TODAY, in our 79th year, we are ready with improved facilities and increased capacity to meet the most exacting needs of the Industry. After all is said . . . it's still quality that counts plus proper designing, precision manufacturing . . . and PROOF OF PERFORMANCE. Why gamble?

* Patent No. 2154387



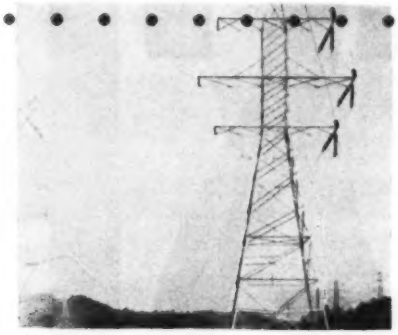
● Fig. 5—Pin-Type Insulators



● Fig. 6—Spool Insulators.

ENGINEERS, MANUFACTURERS AND DESIGNERS SINCE 1873

FOR SUPERIOR INSULATOR QUALITY



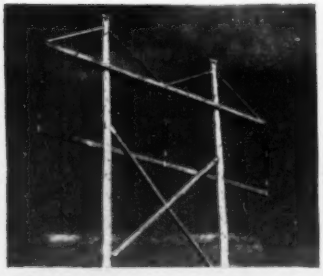
1931 ● Fig. 7—2660-foot span of 69-mile, 132-kv line equipped with Thomas Insulators installed in 1931.

1907 ● Fig. 8—Central California line on which Cap-and-Pin Insulators were first used in 1907.

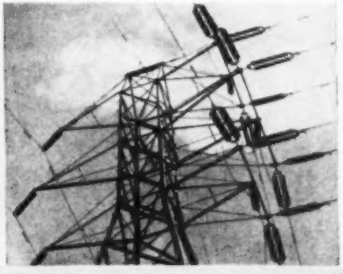
1938 ● Fig. 9—Large Western 230-kv line using 50,000 Thomas Insulators installed in 1938.

Specify Thomas Insulators - The Best by Line Test

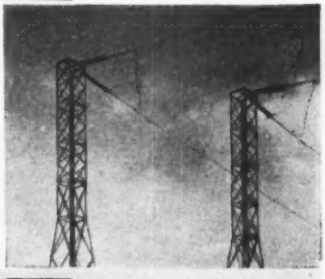
The R. Thomas and Sons Company is a manufacturer and designer of all types of porcelain insulators . . . pin-type, switch, suspension, spools, guy-strain, bushings and special high-voltage porcelain. In addition, Thomas supplies associated line hardware, clamps, fittings, preformed armor rods, and so on.



1948 ● Fig. 10—43,000 Thomas Insulators are installed on this 230-kv, 189-mile line.



1949 ● Fig. 11—5,000 Thomas Insulators make certain that this 132-kv, 14-mile line will give satisfactory service for decades to come.



1950 ● Fig. 12—On right-angle towers, Thomas Insulators have the stamina that assures long life and trouble-free performance.

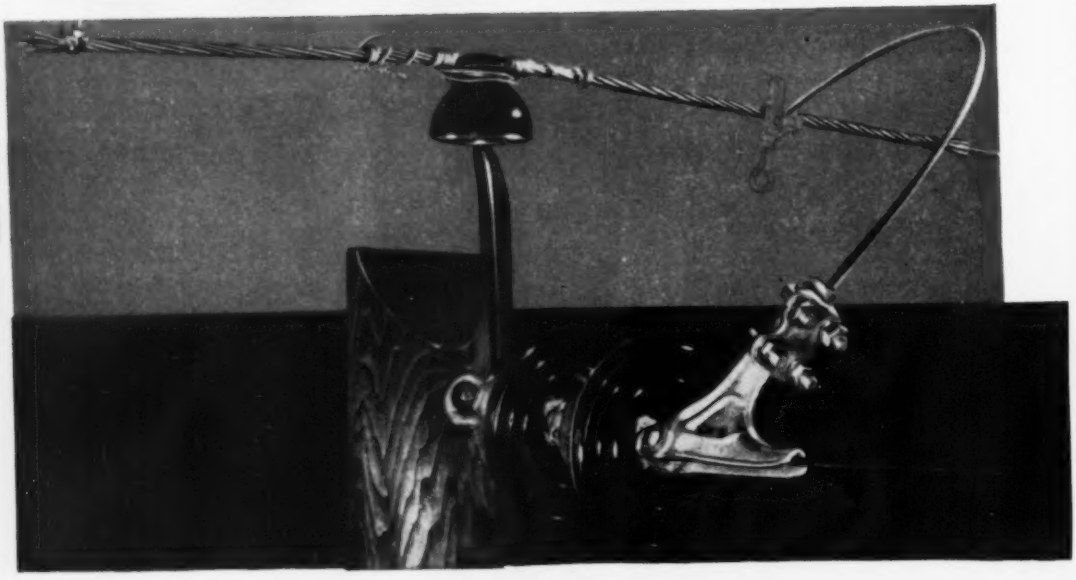
The R. Thomas and Sons Co.

LISBON, OHIO

NEW YORK CHICAGO

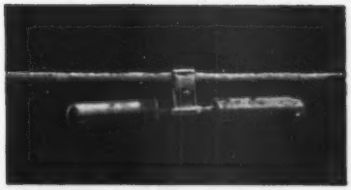
Sales Representatives: C. G. Anderson, *Chicago* • E. B. Anderson Co., *Detroit* • Ken H. Best, *Seattle* • R. E. Cunningham & Son, *Los Angeles* W. H. Eddy Products Co., *Phoenix, Ariz.* • Engineer Sales Corp., *St. Petersburg* • Hamilton Associates, *Denver* • Geo. E. Honn Company, *San Francisco* • W. J. Hugo, *Minneapolis* • Leiser & Company, *Philadelphia* • John G. Pettijohn Company, *Knoxville* • H. E. Ransford Co., *Pittsburgh* • J. F. Schaefer & Co., *Kansas City* • R. J. Sullivan & Company, *Boston* • Tafel Electric & Supply Co., *Louisville* • Walter E. Thompson, *Birmingham* • Triangle Electric Supply Company, *El Paso* • United Electric Supply Co., *Salt Lake City* • Williamson Sales Co., *Shreveport, Amarillo, Dallas, Houston, New Orleans, Pine Bluff* • *Representatives in other principal cities*

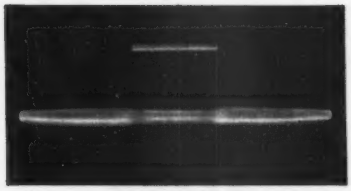
ACSR

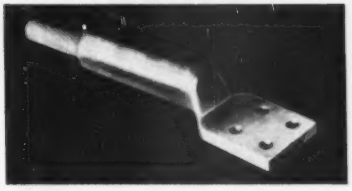


ALCOA

ALCOA







..... and Alcoa Accessories

When you buy aluminum conductors from Alcoa, you can fill all your requirements in a single transaction—and be sure you're getting the right accessories. For Alcoa originated both aluminum conductors and accessories . . . continues to develop and improve them.

Designed for best service, there's an Alcoa accessory for every need. Alcoa backs them up with experienced design, laboratory and manufacturing facilities.

Call your Alcoa sales office for aluminum conductors *and* for accessories that are right—on the line.

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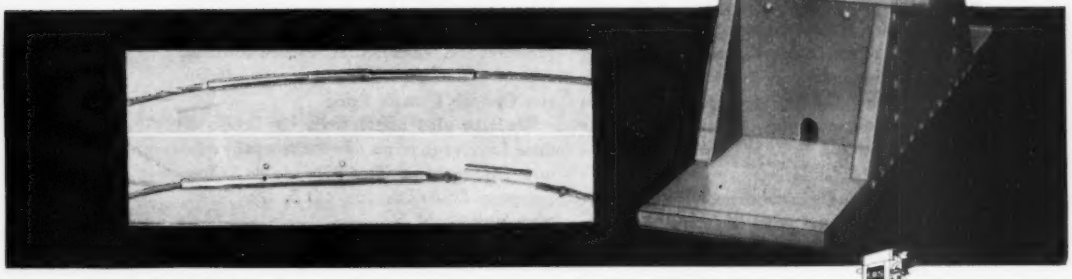
2100-L Gulf Building • Pittsburgh 19, Pennsylvania



FIRST IN ALUMINUM FIRST IN A·C·S·R

"SEE IT NOW" with Edward R. Murrow — CBS-TV every Sunday . . . brings the world to your armchair. Consult your newspaper for local time and channel.

ANOTHER ADVANCE FROM B&W RESEARCH & DEVELOPMENT

Why 26 ELECTRIC UTILITIES B&W pressure-fired boilers

Higher boiler efficiency, lower auxiliary power demands, better operating control, and lower maintenance costs — these are some of the reasons why B&W's pressurized-furnace design is gaining wide acceptance by power companies. At present, 26 electric utilities throughout the country—as well as a number of industrial plants — have in service or on order B&W pressure-fired boilers serving a a total generating capacity of more than 6,000,000 kw. Comprising this total are Radiant, Open-Pass, Integral-Furnace and Stirling units having individual steam capacities ranging between 200,000 and 1,370,000 pounds per hour. Steam-drum design pressures range to 2700 psi and throttle steam temperatures to 1100 F. Fuels include gas, oil and coal—and many units are multi-fuel burning.

Already, several years of intensive operating experience stand behind B&W's pressurized-furnace design. Actual operating units fired with pulverized or crushed coal, including both slag tap and dry ash removal, serve an installed generating capacity of over 1,000,000 kw.

To effect still greater economies in power generation, pressure-firing is often used in combination with various other cost-saving features resulting from B&W's Research and Development program. These include high pressures and temperatures, divided furnaces, cyclone steam separators, gas recirculation, and Cyclone Furnace firing.

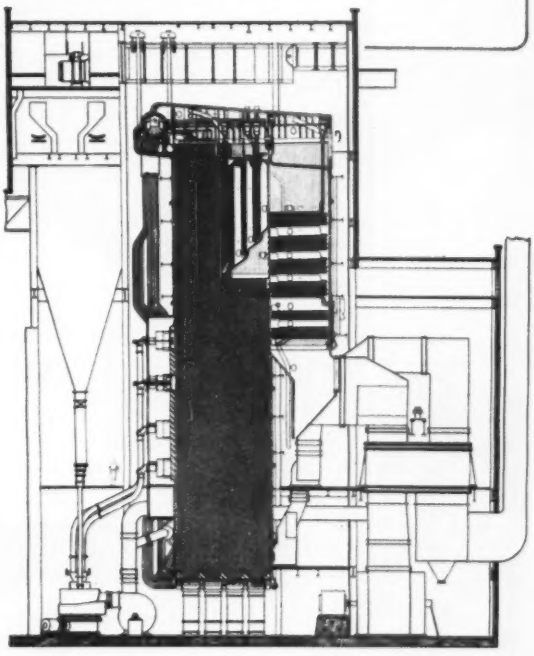
We'll be glad to talk over the details of these features in terms of your company's future requirements. The Babcock & Wilcox Company, Boiler Division, 161 E. 42nd Street, New York 17, N. Y.

BABCOCK & WILCOX

HAVE SELECTED

B&W Pressure-Fired Boilers For a Total Generating Capacity of Over 6,000,000 kw

Appalachian Electric Power Company • Arkansas Power & Light Company • Central Louisiana Electric Company • Central Power & Light Company (Texas) • City of Lansing, Michigan • San Antonio City Public Service Board • Commonwealth Edison Company • Consolidated Edison Company of New York, Incorporated • Dallas Power & Light Company • Houston Lighting & Power Company • Indiana & Michigan Electric Company • Jersey Central Power & Light Company • Ohio Edison Company • Ohio Power Company • Oklahoma Gas & Electric Company • Philadelphia Electric Company • Public Service Company of New Mexico • Public Service Company of Northern Illinois • Public Service Company of Oklahoma • Public Service Electric & Gas Company • Southwestern Gas & Electric Company • Texas Electric Service Company • Texas Power & Light Company • Tucson Gas, Electric Light & Power Corporation • West Texas Utilities Company • Wisconsin Power & Light Company



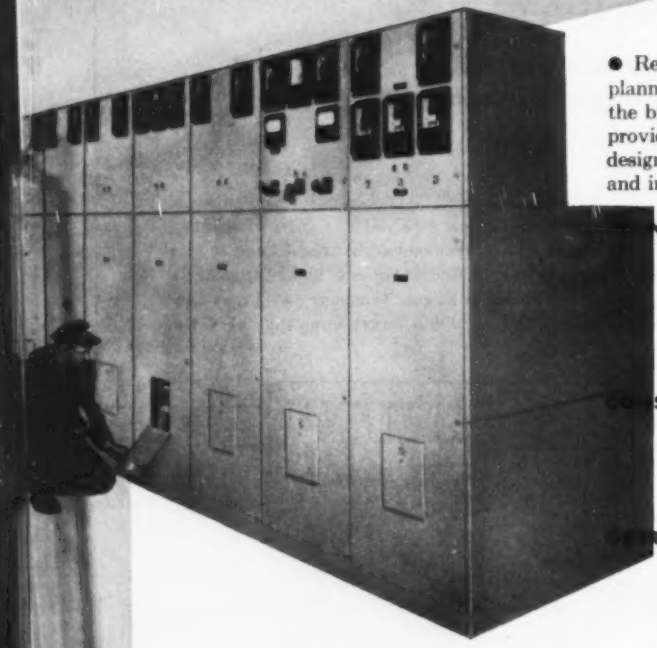
COST-SAVING FEATURES

1. Increased boiler efficiency.
2. Reduced fan power consumption.
3. Lower maintenance costs.
4. Greater operating reliability.
5. Decreased stack losses.
6. Simplified outlet duct and stack arrangement.

Pressure-Firing, Gas Recirculation, Cyclone Steam Separators, Divided Furnace and Reheat are some of the features of this B&W Radiant Boiler now under construction at a new plant of a leading eastern electric company. Rated steam capacity — 1,370,000 lb. per hr. Design pressure — 2050 psi. Pressure at superheater outlet—1850 psi. Final steam temperature—1000 F. Reheat to 1000 F.

G-5321

I-T-E METALCLAD SWITCHGEAR



● Regardless of your engineering responsibility—planning, construction, or operation—you'll welcome the big advantages that I-T-E Metalclad Switchgear provides. Since 1937 the soundness of the I-T-E design has proved itself in central stations, steel mills, and industrial plants the world over.

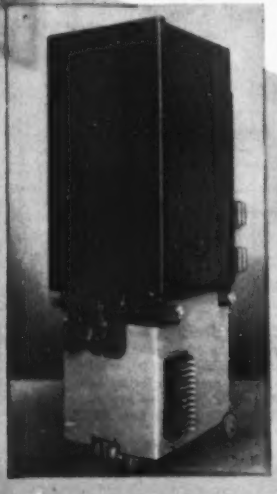
NNING: Planning engineers, concerned with plant wide equipment protection problems in new and expanded distribution systems, prefer I-T-E Metalclad Switchgear because for 15 years, it has assured safe, positive arc interruption. Planning is easier because I-T-E supplies indoor and outdoor equipments in standard structures that are compact, uniform, and readily expandable.

STRUCTION: Construction engineers like the way I-T-E speeds switchgear installation. I-T-E forwards channel bases in advance, so that floors can be prepared ahead of equipment arrival. The arrangement of I-T-E Metalclad Switchgear simplifies the pulling of primary and control cable.

RATION: Operating engineers have to live with switchgear once it's in place. They like I-T-E Metalclad Switchgear because double interlocking makes it safe and easy to operate. The famous "fast-test" feature makes short work of secondary circuit testing—even eliminates opening the breaker door.

4160 VOLTS • 50,000, 150,000 AND 250,000 KVA INTERRUPTING • 600, 1200, AND 2000 AMPERES CONTINUOUS

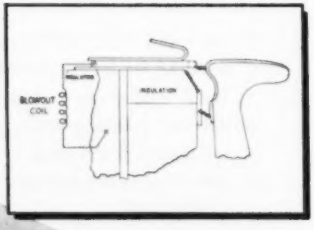
For information, including selection and application data, write for Catalog Section 7004 and Bulletin 7000-A. I-T-E Circuit Breaker Company, 19th & Hamilton Streets, Philadelphia 30, Pennsylvania.



PLANNING ENGINEERS

I-T-E Metalclad Switchgear provides safe, positive arc interruption because I-T-E Type HV circuit breakers are used throughout.

When opening short circuit current near rating, the I-T-E HV breaker interrupts the current so quickly that the moving contact travels only about one inch before the circuit is interrupted. Extra contact travel is provided for interruption of very low current.



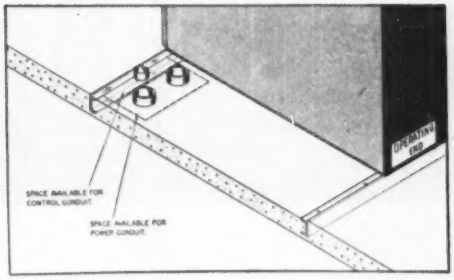
LONG-LIVED INTERRUPTING ABILITY

Arc transfer energizes blowout coil and eliminates metallic connection between front runner and lower current stud. Thus, potential is across arc chute only during arc interruption—resulting in longer chute life.

PROVES ITS ENGINEER APPEAL

CONSTRUCTION ENGINEERS

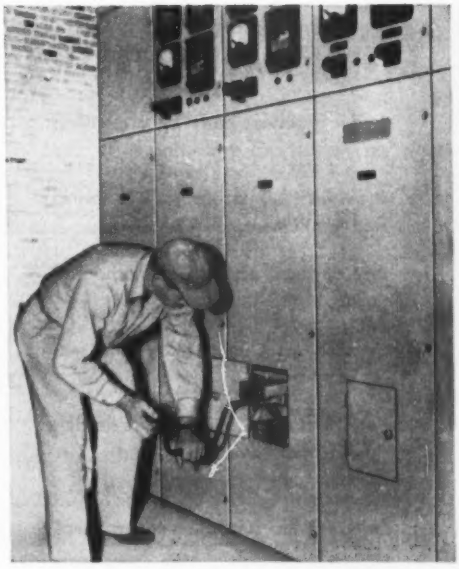
I-T-E provides switchboard floor plans, front view drawings and single line diagrams well ahead of shipment. When you're ready, I-T-E forwards channel bases—your equipment goes in right on schedule! Control and primary cables can enter structure at top or bottom. Control cable connections are located just inside the removable rear panel. You have them completely accessible for inspection and checking *without* de-energizing the circuit, *without* removing the breaker, *without* entering the switchgear structure.



OPERATING ENGINEERS

Important operating advantages of I-T-E Metalclad Switchgear save steps and guard your safety. Here are just a few of them:

1. Secondary circuit testing without removal of breakers from the stationary structure. No separate operation of secondary disconnecting devices is required.
2. The double interlock assures complete safety of personnel and equipment—guards against improper insertion or withdrawal of the circuit breakers. Interlocks are built into the circuit breaker—eliminating complicated engagement mechanisms between the breaker and structure. Adjustments are simplified and interchangeability is assured.
3. Circuit breaker control-relay is mounted on breaker truck; (when breaker comes out, relay comes out. No "climbing" into structure to inspect control-relay).
4. Truck-mounted horizontal removable elements eliminate hours of maintenance usually required for complicated elevator mechanisms.



Full operating positioning is accomplished by mechanical racking.

Specify I-T-E **METALCLAD SWITCHGEAR**

I-T-E CIRCUIT BREAKER CO. • 19th & HAMILTON STS. • PHILA. 30, PA.

R&IE Power Switching Equipment—R&IE Equipment Division • Greensburg, Pa.

EPD Canadian Mfg. and Sales — Eastern Power Devices, Ltd., Toronto

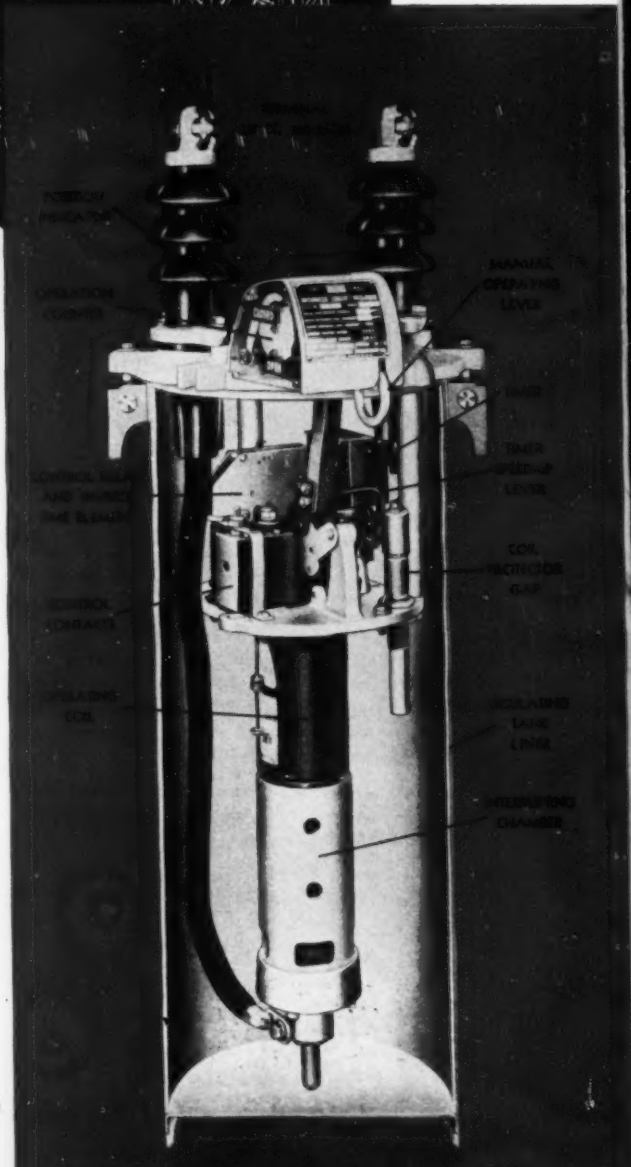
R&IE

POWER CLASS

Save Money— with ECONOMICAL PROTECTION

1. Reduces service costs by preventing unnecessary fuse blowing.
2. Provides full protection to wires and equipment.
3. Greater accuracy through mechanical timing.
4. Coordinates with primary and secondary fuses.
5. Permits normal fusing for selective clearing of overloads and short circuits.
6. Selects with substation overcurrent relays.

Read how "Reclosers Reduce Distribution Interruptions to Practical Minimum", Electrical World May 19, 1952



TYPE MB-1
(shown)

RECLOSERS up to 280 Amperes continuous duty

Bring you Transmission type service for your Distribution System — *Substations and Lines.*

Check the Facts —

1 High interrupting capacity - up to 6,000 amperes!

2 Load currents - 100, 140, 200 and 280 Amp.

3 Insulated Housing - can be grounded.

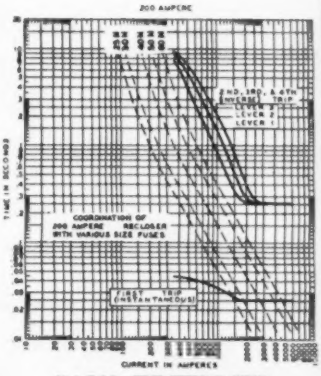
4 Improved fuse coordination - "lightning fast" (1½ cycle initial tripping) followed by -

5 Selective delayed subsequent tripping (adjustable inverse time, or adjustable definite time).

6 Quick reset from lockout. Trip-free reset lever.

7 Improved precision mechanical timer - free from temperature error.

8 Mechanism can be mounted in tank in any angular position in 60 degree steps.



High Fidelity TIME CURRENT CURVE

Ratings —

INTERRUPTING RATINGS IN RMS SYMMETRICAL AMPERES

The Recloser will also interrupt the maximum asymmetrical current on a distribution circuit for which the symmetrical fault current does not exceed these ratings.

Type MB-1			Type MBH	
Continuous Duty Rating of Recloser in Amperes	Service Voltage 2.4 Kv	Service Voltage 7.2 Kv	Continuous Duty Rating of Recloser in Amperes	Service Voltage 14.4 Kv.
100	4000 Amps.	4000 Amps.	100	2000
140	5000 "	4000 "	140	2000
200	6000 "	4000 "	200	2000
280	6000 "	4000 "	280	2000

More Information — Complete Information is available.

For details write:

R&IE EQUIPMENT DIVISION
I-T-E Circuit Breaker Co.
GREENSBURG, PENNA.

The Quick List

CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS

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HORN GAP SWITCHES

INTERRUPTER SWITCHES

CUTOUTS AND THERMO-RUPTERS

DISTRIBUTION EQUIPMENT

SWITCH OPERATING MECHANISMS

SUBSTATIONS

OPEN OR ENCLOSED, ISOLATED PHASE HEAVY DUTY BUSES

KIRK INTERLOCK SYSTEMS

AUTOMATIC RECLOSING EQUIPMENT

METAL CUBICLES

TESTING DEVICES

These Plain, Hard Facts Prove It...

You save from start to finish with

CHEVROLET ADVANCE-DESIGN TRUCKS

Fact No. 1

THEY LIST FOR LESS

Chevrolet trucks *list for less* than any truck with comparable specifications that can handle an equal payload. Yet your money buys a combination of great truck features that you'll find only with Chevrolet. And that means value unmatched by any other truck in its field.

Fact No. 2

OPERATING COSTS SAVE YOU MONEY

Chevrolet's time-proved Thriftmaster and Loadmaster Valve-in-Head engines are famed for fuel, oil and upkeep economies. Extra-rugged frame, hypoid rear axle, Flexi-Mounted cab, and other features keep the truck rolling for many thousands of low-cost miles.

Fact No. 3

A MODEL THAT'S RIGHT FOR YOUR JOB

With Chevrolet's wide range of models, there's never the problem of "too little" or "too much" truck for the job. Each truck is factory-matched to its job. Standard body on standard chassis, or standard chassis for a special body, there's a Chevrolet truck to cut your costs.

Fact No. 4

YOUR INVESTMENT EARNS A HIGHER RETURN

Big demand for Chevrolet trucks means a traditionally higher price when you trade your Chevrolet for a new one. You save money all the way with a Chevrolet—from the day you buy it until the day you trade it. See your Chevrolet dealer now—and save!

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load • POWER-JET CARBURETOR—for smooth, quick acceleration response • DIAPHRAGM SPRING CLUTCH—for easy-action engagement • SYNCHRO-MESH TRANSMISSION—for fast, smooth shifting • HYPOID REAR AXLE—for dependability and long life • TORQUE-ACTION BRAKES—on light-duty models • PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES—on medium-duty models • TWIN-ACTION REAR BRAKES—on heavy-duty models • DUAL-SHOE PARKING BRAKE—for greater holding ability on heavy-duty models • CAB SEAT—with double-deck springs for complete riding comfort • VENTI-PANES—for improved cab ventilation • WIDE-BASE WHEELS—for increased tire mileage • BALL-TYPE STEERING—for easier handling • UNIT-DESIGNED BODIES—for greater load protection • ADVANCE-DESIGN STYLING—for increased comfort and modern appearance.

CHEVROLET DIVISION OF GENERAL MOTORS, DETROIT 2, MICHIGAN

CHEVROLET first in demand in value in sales

BENJAMIN "Magna-Flo" Systems Excel!

that's why Overall Lighting Costs are LOWER!

Because Benjamin "Magna-Flo" Systems excel by every Quality Standard—lighting, electrical and constructional—they can provide high illumination levels at low overall lighting cost. Such cost involves more than the original price of the units. Overall lighting cost also includes the costs of installation, operation, maintenance and replacement. Add them all up and see why you're ahead with "Magna-Flo" Systems (individual unit or continuous line)—because "Magna-Flo" excels by ALL QUALITY STANDARDS!

This chart gives some of the important reasons why:

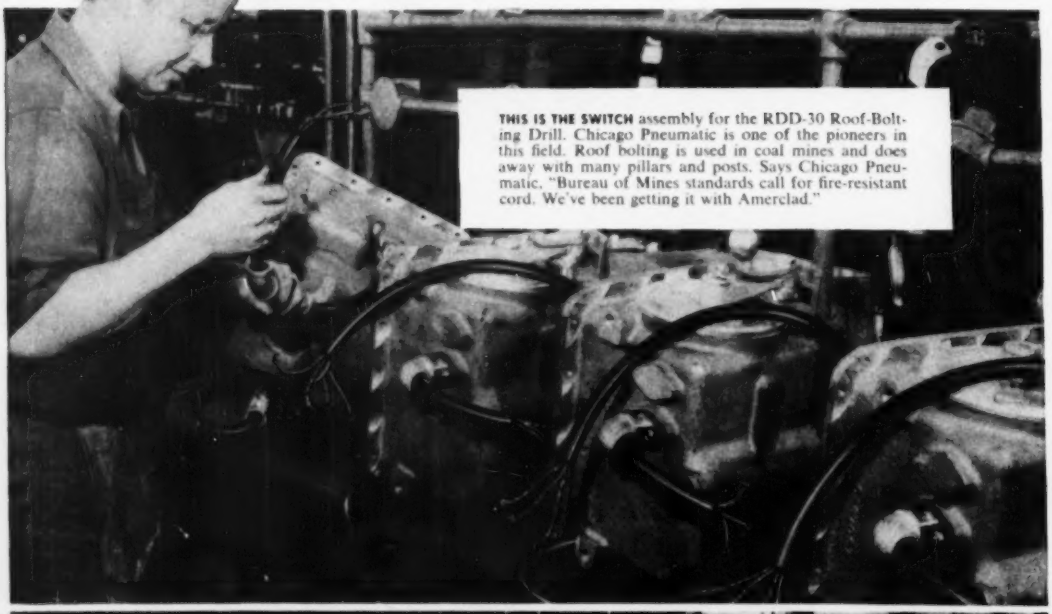
"MAGNA-FLO" CUTS INSTALLATION COST	"MAGNA-FLO" CUTS MAINTENANCE COST	"MAGNA-FLO" CUTS OPERATION COST	"MAGNA-FLO" CUTS REPLACEMENT COST
wide variety of knockouts facilitate wire entrances into unit.	Porcelain Enamel reflecting surface is easy to keep clean with soap and water.	made for efficient utilization of high light output T12 Slimline lamps.	famous Benjamin "built-like-a-battleship" construction of heavy gauge steel.
complete line of sliding hangers.	exclusive "Springlox" lampholders make possible "quick-in, quick-out" lamp maintenance.	high power-factor ETL-approved ballasts for continuously-cool, efficient operation.	rigid channels and reflectors withstand toughest industrial vibration.
single, rugged channel coupling for continuous mounting.	Speedy, exclusive "Lok-Latch" reflector fasteners.	high reflection factor remains constant because genuine Porcelain Enameled reflector does not discolor or become dull with age.	96" reflectors are made in two sections, kept perfectly aligned by positive alignment clips.

FREE Bulletin AD-5705 brings you complete specifications on Benjamin "Magna-Flo" Lighting Systems—famous for "Task-Matched" Lighting Installations.
Benjamin Electric Mfg. Co., Dept. K, Des Plaines, Ill.

Benjamin "Magna-Flo" Systems are Sold Exclusively through Electrical Distributors

B-5035BMB

HERE'S ANOTHER PRODUCT USING AMERCLAD CORDS . . .



THIS IS THE SWITCH assembly for the RDD-30 Roof-Bolting Drill. Chicago Pneumatic is one of the pioneers in this field. Roof bolting is used in coal mines and does away with many pillars and posts. Says Chicago Pneumatic, "Bureau of Mines standards call for fire-resistant cord. We've been getting it with Amerclad."

THIS IS ONE of the Chicago Pneumatic test racks. Drills are tested for speed, accuracy, temperature rise and electrical soundness. Every drill goes through this factory test.

AMERICAN STEEL & WIRE DIVISION
USS
AMERICAN ELECTRICAL WIRE AND CABLE
UNITED STATES STEEL

A STANDARD Cable for

- paper & varnished cambric cables
- asbestos cords and cables
- aerial, underground & submarine cables
- shovel & dredge cables

U·S·S AMERICAN ELECTRICAL

"Our customers say we use the best cords on the market"

HERE, EYELETS ARE soldered on the cable leads after they are stripped. The foreman says "We save time and eliminate waste of cable lengths on this operation because there's no possibility of adhesion between jacket and insulation when the jacket is stripped. With Amerclad this doesn't happen."

Says Chicago Pneumatic Tool Co.

World famous manufacturer of electric tools.

CHICAGO Pneumatic says: "We don't just sell tools, we sell *service* as well, and we learned years ago that inferior cords could cause a lot of trouble for our customers. Today we feel we can't afford to use anything but the highest quality cords, the kind of quality we get with Amerclad."

Amerclad is the name we give to a complete line of portable, heavy-duty, rubber-jacketed and insulated cords and cables made by American Steel & Wire Division. Special rubber and synthetic compounds are available to resist abrasion, fire, oil and grease, sunlight and ozone, as well as *combinations* of these destructive agents. Also, these Amerclad products in the higher voltages are furnished with either metallic or PS Shielding—the conducting rubber tape.

Use Amerclad for the tough jobs, where other cords and cables fail. Use it for trailing leads on dredges and power shovels, where it's dragged over sharp rock and through water. Use it in coal mines where you want a flame and acid-resistant jacket. Equip your product with these long-life Amerclad Cords and Cables and make a good product even better. Amerclad will enable your electrical products to withstand the most grueling service with little or no time out for cord repair.

Mail the coupon now for more information.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL COMPANY
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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

every ***SPECIAL*** *Job!*

- oilproof portable cords
- plastic machine tool & building wire
- special purpose cords & cables

WIRE & CABLE

SEND THE COUPON

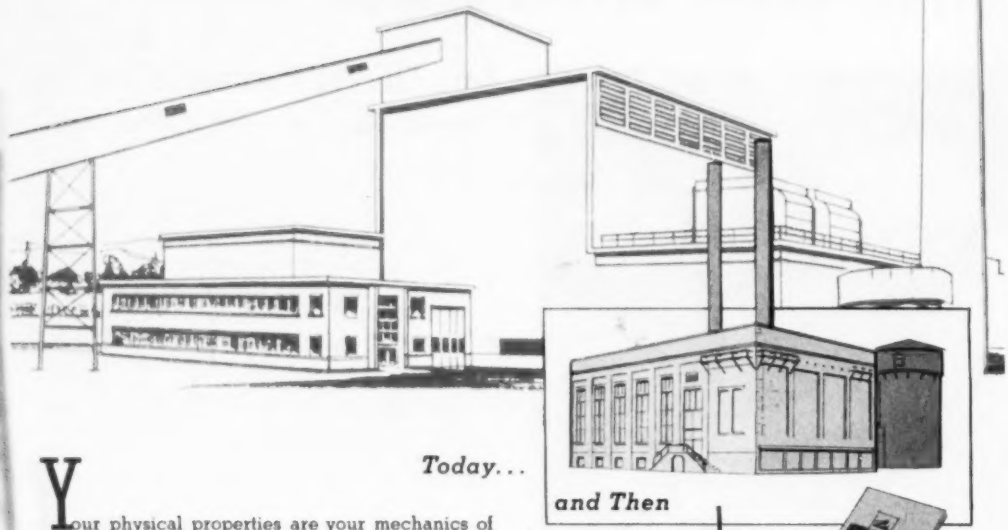
American Steel & Wire Division
Room EE-11, Rockefeller Building
Cleveland 13, Ohio

☐ Please give me more information about Amerclad
☐ I'd like to talk to your representative

Name .....
Firm .....
Address .....
City ..... State .....

UNITED STATES STEEL

As we begin our second half century...



Today...

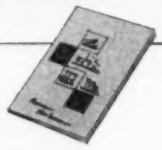
and Then

Your physical properties are your mechanics of existence and their correct design is extremely important. Yet, important as they are, they depend for their very life—and, certainly their profit—on an inner structure, invisible but vital, and that is the company's financial, operating and management structure. The entire field of engineering and management is Pioneer's area of operation to assist you in profitable management.

As an associate of such pioneers as Thomas Edison and George Westinghouse, Henry Byllesby founded Pioneer's earliest predecessor a half century ago. Since then we have grown with Industrial America and, we think, made our own contribution to this era. We understand the aims of business, and over the years we have developed the techniques for realizing them.

Our resources and facilities are indicated here. They are proving valuable to companies of many types and sizes, and may prove equally valuable to you. Use one or a combination of Pioneer's services, for Pioneer is like a variable gear, working smoothly within itself and meshing smoothly with yours.

. . . Alert to overlook nothing which may prove useful, you will want our booklet "Pioneering New Horizons," we feel sure.



If you can use...

- Consulting Engineering and Power Plant Design Service . . .
- Financial Advisory Service . . .
- Stock Transfer and Dividend Disbursement Service . . .
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Pioneer Service & Engineering Co.

231 South La Salle Street · Chicago 4, Illinois

Weight reductions average 30%

in new line of transformers employing

Quinterra* TYPE 6

Another example of savings permitted by this Johns-Manville purified asbestos insulation

A NEW LINE of dry type transformers announced by a prominent electrical manufacturer achieves savings in weight up to 50% in some models . . . 30% on the average. Contributing to these savings is the use of Quinterra Type 6 as layer insulation between the high and low voltage windings.†

Other manufacturers also report that Quinterra Type 6 permits substantial material savings. In addition, they state that this flexible insulation raises overload limits, increases safety, minimizes rejects, lengthens equipment service life, and lowers production costs.

Quinterra Type 6 possesses high thermal stability and lasting dielectric strength. It is a twin-ply, polyvinyl acetate treated purified asbestos insulation with a dielectric strength of 300 VPM. Even when its saturant is baked out by continuous exposure to 200 C, it retains the inherent dielectric of the base sheet which is at least 200 VPM . . . and it remains a dielectric up to 400 C.

Type 6 is the strongest Quinterra because it is made by combining and calendering two layers together into a dense, smooth surfaced insulation. Its good tensile and bursting strengths enable operators to achieve favorable production rates. Further economies result from its large square-foot-per-dollar coverage.

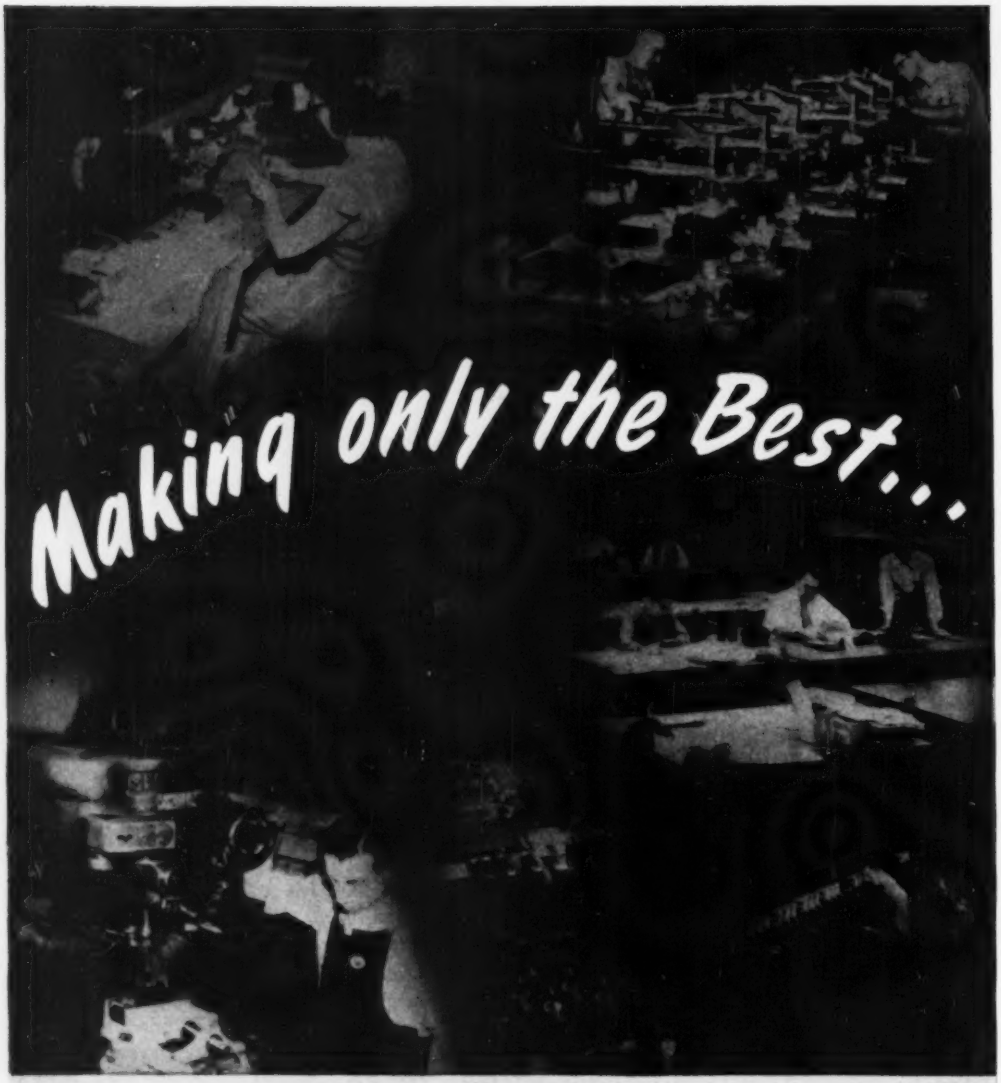
If you are a manufacturer of magnetic or resistance devices, Quinterra Type 6 may enable you to obtain substantial cost reductions. For samples and additional information, write Johns-Manville, Box 60, New York 16, N.Y.

†Quinorgobord #1100, another J-M purified asbestos insulation, is also used as end filler strips.

*Quinterra is the registered trade mark of Johns-Manville's purified asbestos electrical insulation.

JOHNS MANVILLE JM PRODUCTS

Johns-Manville ELECTRICAL INSULATIONS



Oil and Air Circuit Breakers • High and Low Voltage Switchgear
Unit Substations • Instruments • Precision Balances
Watthour Meters • Disconnect Switches • Outdoor
Hook Stick Switches • Air Break Switches
Indoor and Outdoor Bus Supports
Bus Ducts • Substations

ROLLER SMITH

ROLLER-SMITH CORPORATION AND ELPECO DIVISION

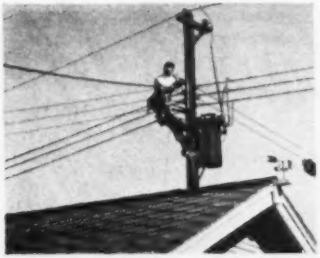
BETHLEHEM, PENNSYLVANIA

ELPECO

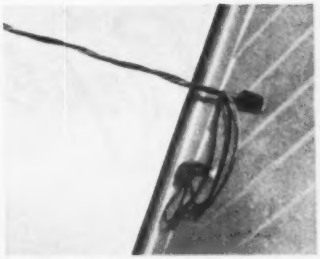
THERE'S A DIFFERENCE

when you specify aluminum conductor

IMMEDIATE SAVINGS—Aluminum conductor gives you *immediate* savings. Initial cost far less than copper. Easier handling because of aluminum's lighter weight.



INSTALLATION SAVINGS—Aluminum's lightness helps insure faster installations. Linemen find it easier to string, handle, move around. Saves time and money.



MAINTENANCE SAVINGS—Aluminum's lightness assures lower tensions on house, pole. Minimum maintenance required on lines and services. Potential *total* savings with aluminum conductor—up to 25%.

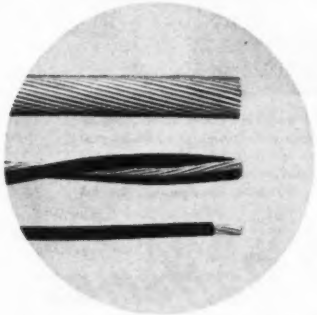
THERE'S A BIG DIFFERENCE

when you specify Kaiser Aluminum conductor

FIELD SERVICE—Experienced Kaiser Aluminum field men work hand in hand with crews on stringing operations, often devise money-saving techniques. They continually check installation schedules—one big reason why Kaiser Aluminum's record for *on-time delivery* is unsurpassed!

ENGINEERING AND LABORATORY SERVICE—Kaiser Aluminum engineers suggest methods to improve quality, cut costs. They make full use of top-notch Kaiser Aluminum laboratories, call in specialists for organizational meetings, furnish sag and tension charts.

CONVENIENT DISTRIBUTOR SERVICE—Kaiser Aluminum conductor distributor offices are located nearby you, wherever you are. They stock a wide range of Kaiser Aluminum conductor—offer quick service and helpful technical assistance.



THIS COMPLETE SERVICE is available to you at no obligation when you specify Kaiser Aluminum conductor. *Act now!* A letter or telephone call is all that's required. Also request free pamphlet giving complete engineering data on new Kaiser Aluminum covered conductor—both weatherproof line wire and self-supporting Triplex cable for service drops and secondary distribution lines.

Contact any Kaiser Aluminum office in principal cities, or one of our many distributors. Kaiser Aluminum & Chemical Sales, Inc., Oakland 12, California.

Kaiser Aluminum

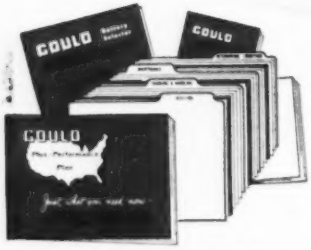
Setting the pace . . . in growth, quality and service

NEOPRENE AND POLYETHYLENE COVERED CONDUCTOR, SOLID AND STRANDED • SELF-SUPPORTING TRIPLEX CABLE • ACSR • ALL ALUMINUM CONDUCTOR

THE BATTERY OF *Perpetual Youth!*

Gould Planté—
The Aristocrat of
Stationary Batteries

The one big reason why Gould Planté batteries last practically forever is the use of *pure lead* positive plates! They have no antimonial impurities to contaminate negative plates and shorten battery life. And, a huge reserve of pure lead continually replenishes the spent active material in the positive plates to give them the lowest per annum cost of any battery on the market! For utmost dependability and economy, there's *nothing* like Planté—the Aristocrat of Stationary Batteries.

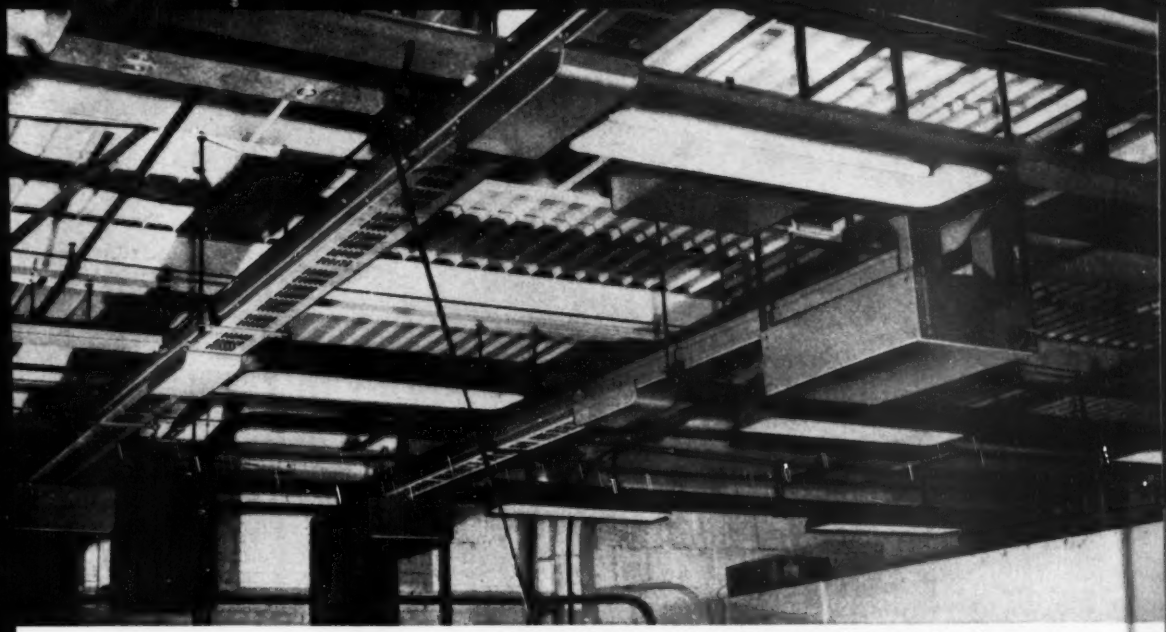


You may be able to save up to 50% on maintenance costs throughout the life of your stationary batteries through the use of the Gould Plus-Performance Plan. Write Gould Battery Information Headquarters for full details.

GOULD *Industrial Batteries*

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries



TYPICAL TRUMBULL LVD FLEX-A-POWER installation in a large factory.

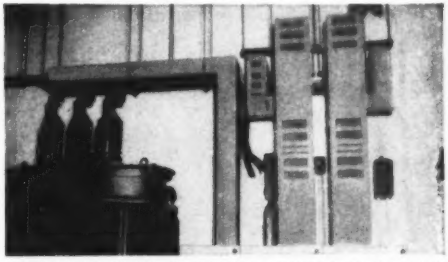
Modern power distribution made more convenient, more economical!

Industry has long taken advantage of the benefits of Trumbull LVD FLEX-A-POWER. FLEX-A-POWER's economy of installation, efficient performance and complete flexibility have aided in cutting plant overhead costs throughout the nation.

Now, Trumbull Electric offers LVD (Low Voltage Drop) FLEX-A-POWER with *aluminum* busbars — a major contribution to the busway field.

LVD now has the outstanding additional advantage of being 25 to 35% lighter in weight — making LVD FLEX-A-POWER easier to handle and cheaper to install. All joints are silver plated for positive contact and longer life. In many cases there is less voltage drop, which contributes to operating efficiency.

There is no delivery problem with aluminum LVD. Write for complete information.



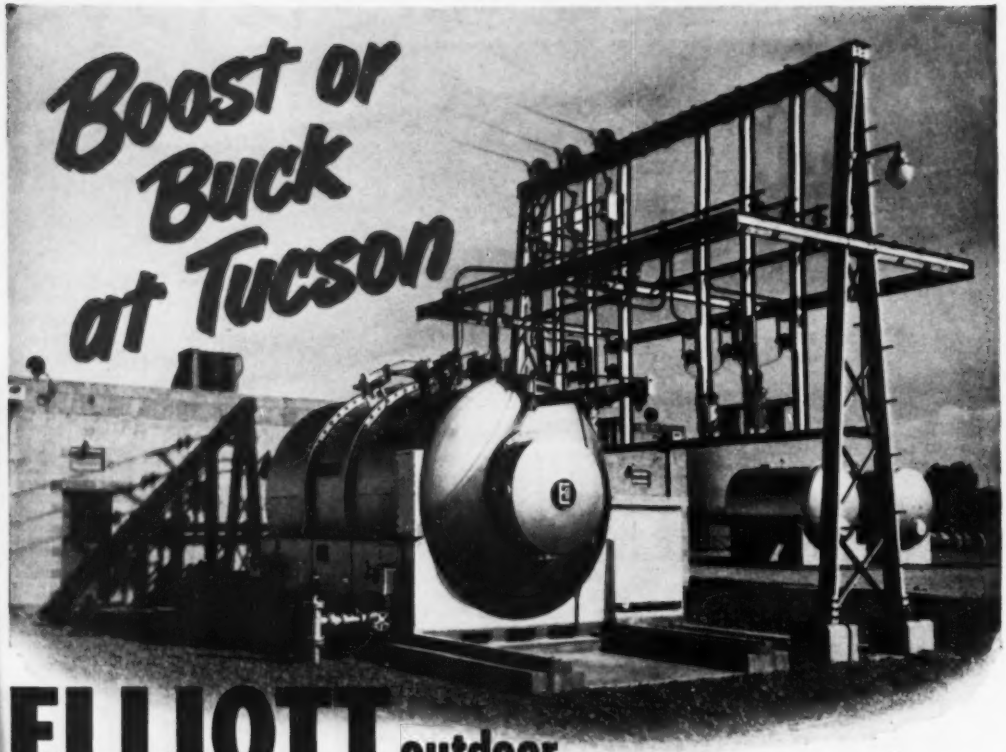
ONE OF MANY APPLICATIONS OF ALUMINUM LVD FLEX-A-POWER is as a feeder from transformer to switchboard.

The modern Trumbull LVD FLEX-A-POWER is available with current ratings of from 600 to 3000 amps. in 2, 3 or 4 pole construction, 4000 amps in 2 and 3 pole construction, and is suitable for 600 volt service.

Trumbull Assures LASTING FLEXIBILITY in Power Distribution

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.



ELLIOTT outdoor hydrogen-cooled synchronous condenser

. . . serves the distribution system operated by the Bureau of Reclamation, Tucson, Arizona. This versatile machine is designed to deliver either leading or lagging kilovars.

Rated for 0.5 psi hydrogen pressure, this machine delivers 20,000/8,400 kva, 13,000 volts, 720 rpm. Operated at 15 psi hydrogen pressure, this condenser will deliver 24,000 kva, 0 pf leading.

Noteworthy Features...

[redacted]

Extended soleplates for rollers to facilitate movement of end domes and stator. Crane-boom on end dome with two-ton hoist to remove bearings, etc. through door.

[redacted]

Clean lines, no unsightly pipe connections, no protruding terminal boxes, no waste area.

[redacted]

Gas-to-water heat exchanger in each dome. Carefully-engineered, positive-action fans at both ends of rotor.

[redacted]

Parts proportioned to insure efficient utilization of materials, and streamline flow of cooling gas contribute to loss reduction.

[redacted]

Access to machine and exciter brushes is through hinged exciter cover in end dome.

ELLIOTT Company

R2-6

Ridgway Division
RIDGWAY, PA.

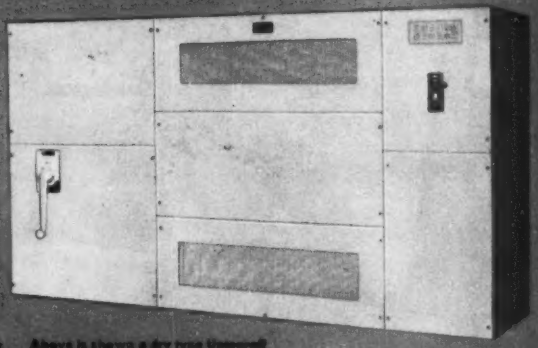
Plants at: JEANNETTE, PA. • RIDGWAY, PA.
AMPERE, N. J. • SPRINGFIELD, O. • NEWARK, N. J.
DISTRICT OFFICES IN PRINCIPAL CITIES

For Unit Substations

Uptegraff Dry Type Transformers

Complete with enclosure

Uptegraff Dry Type Transformers for Unit Substations are furnished in standardized sizes and ratings from 112.5 KVA to 2000 KVA, 5 to 15 KV inclusive. They are furnished with sturdy, well-ventilated steel enclosure if complete unit is desired. Terminals can be top or side mounted.



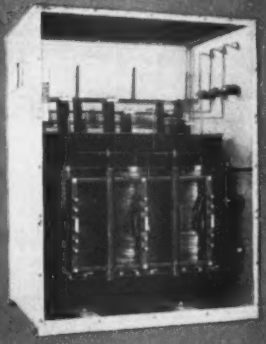
Core and Coil Assembly only

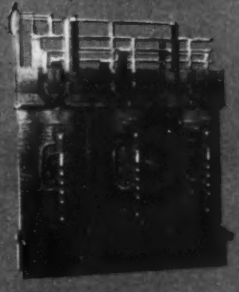
For building into a complete substation enclosure, Uptegraff furnishes dry type the core and coil assembly alone, with rigid clamping frame and sturdy terminal construction. All Uptegraff dry type transformers are designed and built for dependable service. They are mechanically strong and electrically efficient.

Above is shown a dry type Uptegraff substation power transformer. Fully protected by steel enclosure, yet ample provision for ventilation.

Right—Substation transformer with front cover removed, showing H. V. Terminal arrangement.

Below—Uptegraff Core and Coil assembly for installation in unit substation.





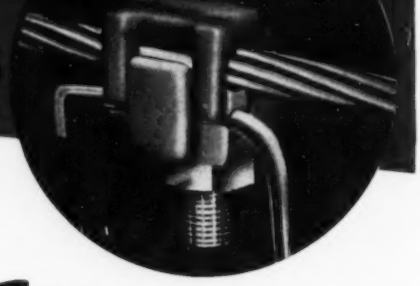
R. E. Uptegraff Manufacturing Co.

Scottdale, Pa.

Security

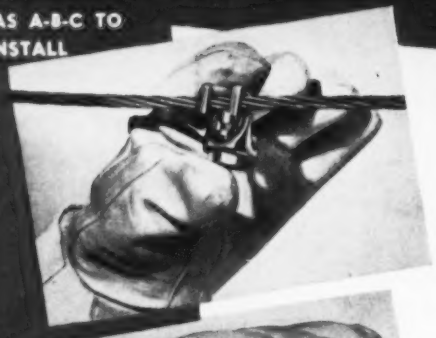
WITH BRONZE ONE PIECE
K-90 AND K-900 CONNECTORS

COMPLETE
TROUBLE FREE
POSITIVE CONNECTION



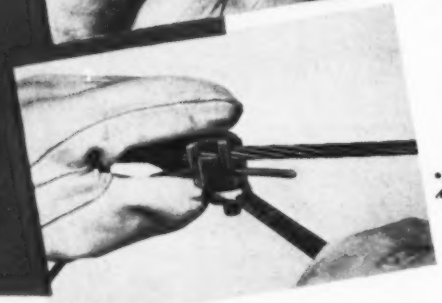
EASY AS A-B-C TO
INSTALL

A



B

C



For

- **GREATER STRENGTH:** *Compresses Conductor sealing out high resistance oxide formation on contact areas.*
- **GREATER EFFICIENCY:** *Retains high pressure contact during vibration and temperature changes.*
- **GREATER DEPENDABILITY:** *Surpasses Mercurous Nitrate Specifications ABW 124-1*, insures against seasonal and stress corrosion cracking failure.*
- **GREATER ECONOMY:** *Lower installation cost, five sizes for connections up to 500 MCM.*
- **GREATER FLEXIBILITY:** *Taps, splices and dead ends easily completed with gloves or hot line tools.*

**Identical to ASTM B-154-43 Mercurous Nitrate Specifications except ABW-124-1 specifies stress components which is a more severe test.*

WRITE TODAY FOR BULLETIN K-150
on K-90 and K-900 DISTRIBUTION
CONNECTORS

OUR PRODUCTS ARE QUALITY CONTROLLED FROM INGOT TO FINISHED PRODUCT

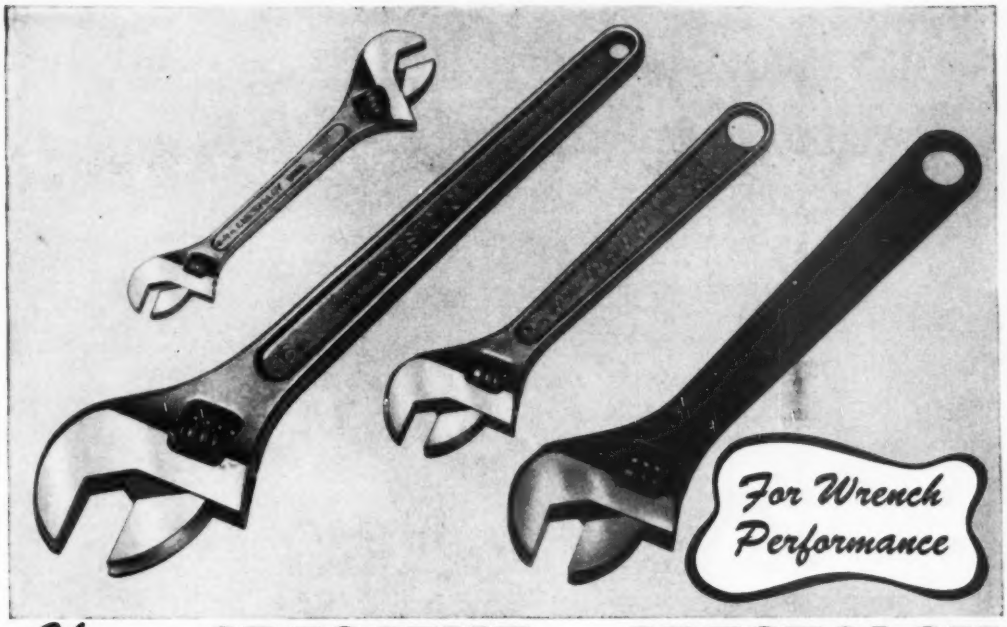
CONSULT ONE OF OUR NEAREST EIGHTEEN REPRESENTATIVES OR CONTACT OUR MAIN OFFICE

ANDERSON BRASS WORKS, Inc.

Aluminum *Bronze*

POST OFFICE DRAWER 2151

BIRMINGHAM, 1, ALABAMA



Choose CRESCENT *or* CRESTOLOY

● Since more Crescent and Crestoloy Adjustable Wrenches are sold today than any other brand, an explanation of the differences in these two famous Crescent tools may be appropriate.

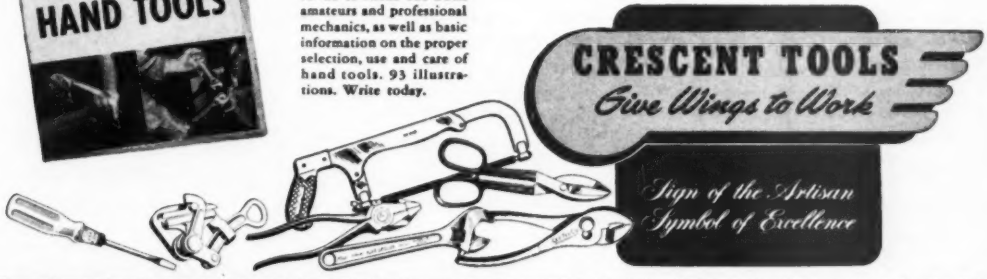
CRESTOLOY Wrenches are forged from a special alloy steel permitting thinner, trimmer design with greater strength and less weight than conventional types. They are available in Single End patterns, 4" to 24" size. Double-end in four models combining 4-6; 6-8; 8-10; 10-12 inch sizes.

The 15", 18" and 24" sizes, available in Single End pattern only, are distinguished by their tapered handles. There is no stronger or finer Adjustable Wrench than CRESTOLOY.

CRESCENT Wrenches are forged from selected carbon steel and specially heat-treated to increase their toughness and durability. Due to their lesser cost and relatively great strength, they are widely used in industrial and service operations where thinness is not essential. Available in Single End Patterns, 4" to 18".

Both Wrenches represent the best in design and workmanship, and carry the same guarantee.

GET YOUR FREE COPY!
This new 20-page booklet provides many useful how-to-do-it ideas for both amateurs and professional mechanics, as well as basic information on the proper selection, use and care of hand tools. 93 illustrations. Write today.



Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

5 Ways to Speed Up Your Service Work

Series 44-90 can be installed on chassis having C.A. dimension of approximately 48"

Series 44-75 for chassis having approximately 40" C.A. dimension.

Series 44-104 for single or dual rear wheel chassis having 60" C.A. dimension.

Series 44-L-90 for chassis having approximately 48" C.A. dimension.

Series 44-L-104 for 60" C.A. chassis having single or dual rear wheels.

POWERS American

SERIES 44 and 44-L

SERVICE AND MAINTENANCE BODIES

These five bodies have an impressive record for saving time and money on service jobs. Compartments are equipped to keep tools and supplies safe and orderly — easy to inventory before leaving for the job — easy to find upon arrival. The bodies are adaptable to a wide variety of service operations, and each model can be transferred to a new chassis when the original truck wears out. If you're looking for new ways to get more productive man hours, you'll want full information on Series 44 and 44-L bodies. Why not send for complete details . . . now?

Clip this coupon and attach to your letterhead!

McCABE-POWERS AUTO BODY CO., 5900 N. Broadway, St. Louis 15, Mo.
Please send me complete information on the following:

- ☐ Series 44-75
- ☐ Series 44-90
- ☐ Series 44-104
- ☐ Series 44-L-90
- ☐ Series 44-L-104
- ☐ Line Construction Bodies
- ☐ Revolving Aerial Ladders
- ☐ Hydraulic Towers
- ☐ .....

Name ..... Title .....

Company .....

Address .....

City ..... Zone ..... State ..... ST

POWERS American DIVISION

PUBLIC UTILITY BODIES & EQUIPMENT

McCABE-POWERS AUTO BODY CO.

MAIN OFFICE AND PLANT
5900 N. Broadway • St. Louis 15, Mo.

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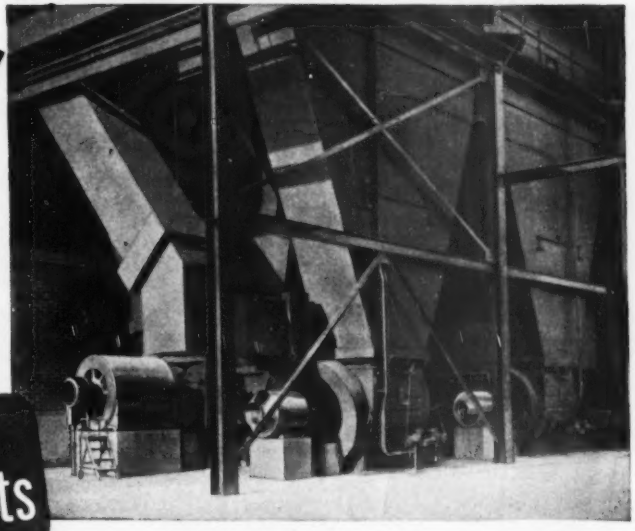
Latham Sq. Bldg. • Oakland 12, Calif.

STEPLESS SPEED CONTROL

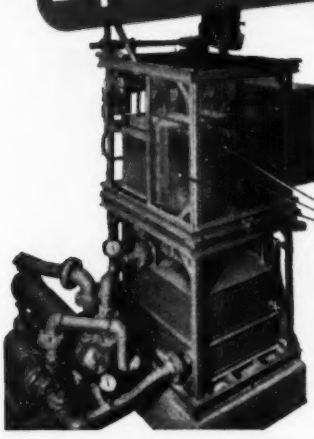
Engineered

for boiler draft fans

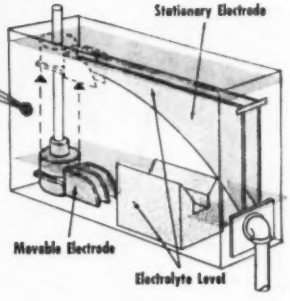


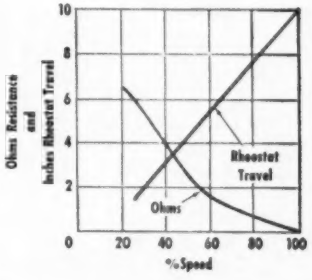
ALLIS-CHALMERS

Liquid Rheostats



FOR PROPER DRAFT CONTROL of boilers, Allis-Chalmers Liquid Rheostats are used in the secondary circuits of four 600 horsepower wound-rotor motors driving induced draft fans at the Edge Moor Station of the Delaware Power & Light Company. Direct coupling of fans and drive motors simplifies bearing alignment and maintenance problems.





TYPE 257 LIQUID RHEOSTATS can be placed in any convenient spot because only electrical connections are required. In this case, they are on the lowest floor of the power plant; the tube type TEFC drive motors are outdoors.

RHEOSTAT CELLS have both a movable electrode and a variable electrolyte level. The movable electrode is always completely immersed. Hot spots are eliminated by directing the flow of cooled electrolyte through the electrode plates.

STRAIGHT LINE SPEED CHARACTERISTICS are designed into these rheostats for each application. Needed resistance characteristics are built in by shaping the stationary electrode, and by fixing distance between electrodes.

ALLIS-CHALMERS

Allis-Chalmers Liquid Rheostats have but few moving parts . . . no arcing contacts. Electrodes can be actuated by electric, pneumatic, or hydraulic operators. Call your A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin for leaflet 14S7544.

A-3721

M. W. KELLOGG

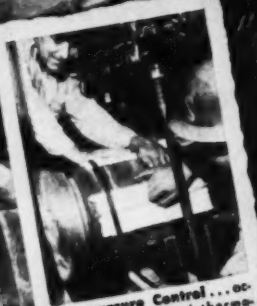
American Gas & Electric Service Corp.
Boston Edison Co.
Central Hudson Gas & Electric Co.
Companie Argentina De Electricidad
(Argentina)
Companie De Fuerza Del
De Mar

PICTURES TELL THIS IMPORTANT STORY BEST!

. . . final turbine lead for 1000 F — 1850 psi installation goes in. See why Kellogg handles many of the most important hi-temperature, hi-pressure systems.

Line-up . . . perfect alinement micrometer tolerances of sections weighing tons.

Check-up . . . engineers verify the proper spacing in weld grooves and fit of backing rings.



Temperature Control . . . accurately positioned thermocouples control temperature under all conditions.

The Preheat . . . induction heating at optium temperature assures crack-free weld.

First Bead . . . senior-engineer supervised . . . complete fusion, uniform backing ring penetration are "musts."

No Letdown . . . slag-free surfaces, uniform weld-metal deposits, constant temperatures on each successive layer.

Finished? . . . welding completed, yes . . . but then comes Radiographing and vital multiple hour stress relieving.

. . . engineers have . . . better thought. It's a fact that all of the meticulous work done in the pre-fabrication of critical alloy piping sub-assemblies can be undone through improper field assembly and welding.

. . . now evaluates . . . position. Adhering over the years to the principle of close integration of basic research, engineering fabrication and construction—Kellogg believes there is no better demonstration of its value than the demand for Kellogg pre-fabrication and installation of critical electric utility piping.

KELLOGG

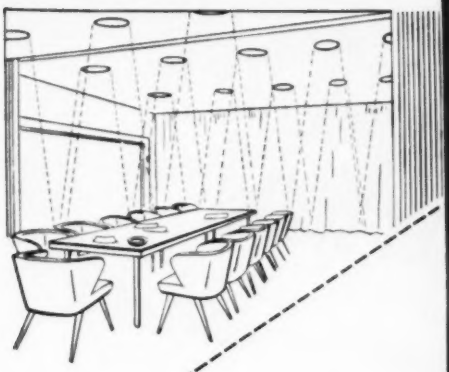
OTHER FABRICATED PRODUCTS Including:

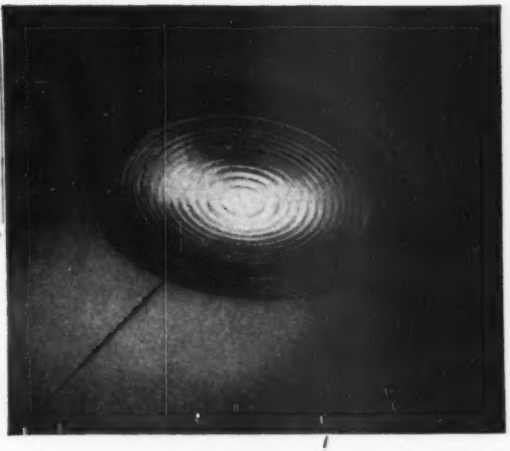
Pressure Vessels . . . Vacuum Vessels . . . Fractionating Columns . . . Drums and Shells . . . Heat Exchangers . . . Process Piping . . . Bends and Headers . . . Forged and Welded Fittings . . . Radial Brick and Concrete Chimneys.

for 51 years an integral part of industrial progress!

Fabricated Products Division—The M. W. Kellogg Company PULLMAN

New York, Jersey City, Buffalo, Los Angeles, Tulsa, Houston, Toronto, London and Paris.





You get the most out of incandescent lighting

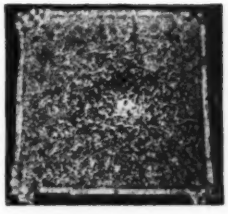
with PYREX® brand Standard and "Double-Tough" Lenslites

PYREX brand LENSLITES give you unusual design flexibility. Whenever design plans call for controlled incandescent lighting, specify PYREX brand LENSLITES. Used in recessed ceiling fixtures, they provide a wide variety of unusual lighting effects.

For example, high intensity, concentrated beams for counter lighting in stores can be had by placing lamps at focal length and using LENSLITES with concentrating patterns. Soft lighting effects for auditoriums, banks, etc., result from moving the lamp closer to the lens, or by using wide or extra-wide angle pattern LENSLITES. And by offsetting the lamp, light beam offsets up to 20° are possible. This is excellent for display lighting.

"DOUBLE-TOUGH" LENSLITES provide added protection for hazardous locations. For hazardous locations, such as psychiatric wards, prisons and similar institutions, or for locations where possible explosion might be a hazard, "DOUBLE-TOUGH" tempered LENSLITES are recommended. The tempering process doubles their strength. And even more important, should "DOUBLE-TOUGH" LENSLITES be broken for any reason, they disintegrate into small fragments—thus minimizing danger from broken glass.

Get further information, including applications and installation data, on PYREX brand Standard and "DOUBLE-TOUGH" (tempered) LENSLITES today.



When the limit of strength of a "DOUBLE-TOUGH" (tempered) LENSLITES has been reached it disintegrates into small interlocking fragments, as shown. This "dicing" greatly reduces hazards of lacerations from large, jagged pieces of broken glass.

Corning Glass Works

PYREX

Dept. EW-11, Corning, N. Y.

Please send me:

- ☐ Bulletin LS-9, "PYREX BRAND LENSLITES"
- ☐ Bulletin LS-32, "CORNING BRAND GLASSWARE FOR FLUORESCENT LIGHTING"

NAME_____ TITLE_____

FIRM_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

Of Special Interest to Utility SALES Staffs!

Plan to Enter the Competitions for the

George A. Hughes Awards of 1952

Your company may be having unusual success with a sales idea or a promotion plan that is solving a major appliance merchandising problem in your area. Why not give it a chance to gain recognition for you or your company in the 1952 George A. Hughes Awards Competitions? Prizes are to be awarded in the following fields of activity:

- **Electric Kitchen Promotion**
- **Electric Range Promotion**
- **Electric Water Heater Promotion**
- **Electric Dishwasher Promotion**
- **Commercial Cooking Promotion**

The George A. Hughes Awards for 1952 will be based strictly on productive sales ideas. The size of your company or existing conditions will have no bearing on the award decisions. Separate prizes are to be awarded in each of the above categories and separate prizes are to be awarded both large and small companies.

Elaborately prepared entries will have no advantage over simple, documented case histories of your successful promotion programs. Plan now to enter one competition or more. The Hughes Awards brochure will give you the complete details.

The 1952 Hughes Award brochures have been mailed to operating electric utility companies. If you need additional information write to:

Edison Electric Institute
420 Lexington Avenue
New York 17, N. Y.

Hotpoint Co.

(A Division of General Electric Company)

5600 West Taylor Street • Chicago 44, Illinois

DESIGNED

. . . with These Points in Mind!

Type MH-2P

Type MH-2S

DUNCAN

CAPACITY

Elements mounted in the back of the meter allow shortest possible current coil leads—more capacity can be built in. All MH 50-ampere socket-type meters have adequate capacity for 200 amperes continuous load, when installed in mounting devices of comparable capacity.

IMPULSE STRENGTH

The electromagnet insulation has been increased to 6500 volts (60 cycle, rms)—2½ times the maximum initial acceptance test. An Alnico damping magnet prevents calibration changes due to lightning surges.

ACCESSIBILITY

As with all Duncan meters, adjustments are accessible from the front. "Micro-set" action greatly reduces testing time. Meter discs are accessible for every type of testing.

APPEARANCE

The Type MH polyphase meter is a meter of clean-cut design. A neat appearing "utility representative" on any customer's premises.

DUNCAN

makers of watthour meters for over fifty years

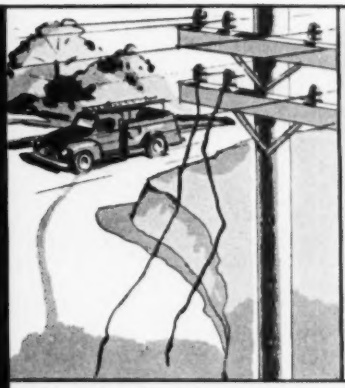
DUNCAN ELECTRIC MFG. CO. **LAFAYETTE, INDIANA**

NOW... full qualification approval, MIL-M-10304 U.S. Signal Corps --Ruggedized Meters

Weston Ruggedized Instruments (Model 1521 Class 52—300 microamperes through 8 milliamperes d-c inclusive) have received full qualification approval from the U. S. Signal Corps under specification MIL-M-10304. For full information contact your local Weston representative or write: Weston Electrical Instrument Corporation, 617 Frelinghuysen Avenue, Newark 5, New Jersey.

WESTON *RUGGEDIZED INSTRUMENTS*

6 ways to cut your costs WITH Motorola 2-Way Radio



1 **Cut outage time**—immediate dispatching of line crews speeds repair work, averts *anticipated* trouble. Motorola radio brings 2-way contact with your crews *anywhere!* Instantly!

2 **Reduce "dead" mileage**—with Motorola radio you contact the *nearest* crew, send them over the *shortest* route. Motorola takes shocks of rough roads, operates in all weather.

3 **Save wasted man-hours**—your crews report immediately when a job is done; there's no searching for communication in remote areas. Motorola is a rough-*and*-ready tool for your line crews.

4 **Speed trouble shooting**—Handie-Talkie® portables help co-ordinate work, isolate trouble quicker. When storms threaten, crews stay on the job—ready for trouble *before* it happens!

5 **Get reports sooner**—join your network with local police, fire and public service radio for immediate reports of fires, accidents and other possible causes of power failure. Motorola serves them all.

6 **Cut vehicle maintenance costs**—Motorola radio dispatching means less mileage, less gas, oil and depreciation. Motorola *pays for itself* in savings in a relatively few months.

Choice of more and more Utilities Companies

Motorola 2-Way Radio

pays for itself many times over

With these cost-cutting advantages you can improve customer service, make greater profits. Motorola offers you *complete* communication service . . . outstanding performance . . . rugged dependability. Write today—your local Motorola engineer will show you how Motorola can cut your costs.

Motorola®

Communications and Electronics Division
4545 Augusta Blvd. Chicago 51, Illinois
Rogers Majestic Electronics Ltd., Toronto, Canada

The STS Transocket®

Connect the service leads . . . plug in the meter . . .

That's all!

The STU Heavy-Duty Socket

There's no need to devise special metering facilities for heavy current applications when you use Westinghouse Transockets. All components are in place . . . complete with secondary wiring—ready for installation . . . all in a single package! Just connect the service leads, plug in the meter . . . that's all.

The STU High-Capacity Socket lets you utilize the full inherent capacity of Westinghouse 50 ampere meters, when installed on services using #4 0 wire. It's now available for polyphase as well as for single-phase applications.

The STS Transocket combines the socket and Type MR current transformers in one compact enclosure . . . handles heavy loads up to 400 amperes.

Both units are ready to install . . . inexpensively . . . easily . . . and take standard S-Type meters.

Here's real help! The Westinghouse "Meter Socket Selector," B-5284, makes it easy for you to select the proper socket for any application. It's 20 pages, fully illustrated, covering all types of service . . . all capacities. To get your copy, write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-40426-A

YOU CAN BE SURE...IF IT'S

Westinghouse

METERS

Your decisions-faster-with KARDEX

"Just one moment – I'll give you the answer . . ." (and he *knows* his decision is going to be right, based on complete, accurate data).

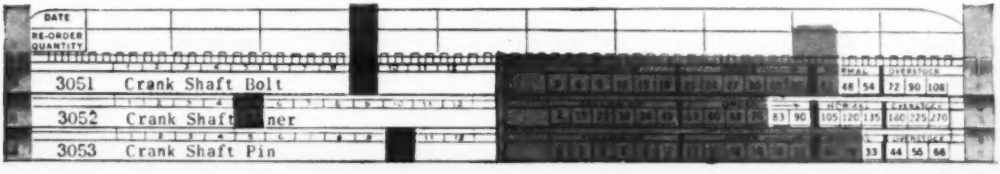
That's Kardex administrative "fact-power" in action . . . and thousands of progressive companies, in every field of commerce and industry, are profiting by it daily.

You, too, can profit through the finer yet firmer executive control Kardex can give you over sales, production, inventory and other phases of your business. Kardex not only integrates and concentrates related facts for quick reference – it signals major items of information in convenient, bar chart form. You can see . . . compare . . . analyze . . . execute . . . all in a matter of seconds.

Now, moreover, you can profit by new Kardex developments such as Kardlok (see picture below), and by the host of engineering improvements embodied in the new Kardex Imperial equipment. See for yourself at the nearest Remington Rand Business Equipment Center . . . or write for free folder No. KD 613, Management Controls Reference Library, Room 1502 315 Fourth Ave., New York 10.

Remington Rand INC.

KARDLOK . . . *illustrated here with three overlapping record pockets selected from a typical Kardex record. Blisters formed in the signal mate with die-cuts in the record card, permitting quicker, easier setting of signals . . . caliper-accurate positioning of signals . . . and positive locking of signal settings.*



install Duraline...

DURALINE* gives longer, better service because of its unique construction — a continuous, interlocked fibrous sheath, thoroughly impregnated with genuine URC saturants, then covered with URC finishers.

and forget about **this**

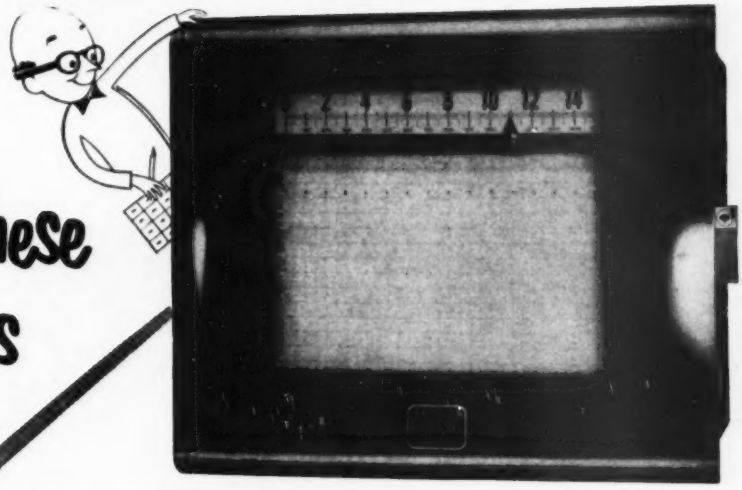
DURALINE provides finest weatherproof performance . . . keeps moisture out . . . won't festoon . . . gives added protection against damage by foreign objects.

*Reg. U. S. Pat. Off.

the right cable for the job

ANACONDA® **WIRE AND CABLE**

Find out,
from your nearest
Anaconda Sales Office,
all the facts about
Duraline with copper, Copperweld or aluminum conductor. **Anaconda Wire & Cable Co.**, *25 Broadway, New York 4, N. Y.*



Check these features OF THE BRISTOL DYNAMASTER

—the electronic master-mind for your measuring, recording and telemetering problems

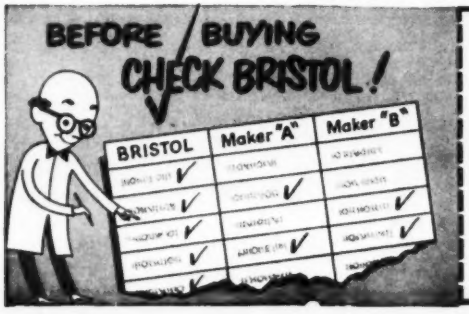
- ✓ Continuous-balancing electronic circuit responds instantly to minute changes
- ✓ All types of electric and air-operated controllers offered
- ✓ Available as a self-balancing bridge or potentiometer
- ✓ Trouble-free operation
- ✓ Electronic component uses vacuum tubes available at any radio supply house
- ✓ Full-scale pen travel in 7, 3 or ⅗ seconds
- ✓ Chart speeds from ¾ in. per hour to 7200 in. per hour
- ✓ Multiple recorders up to 16 points
- ✓ Components interchangeable and easily replaced on all Dynamaster models
- ✓ Immune to most vibration or shock
- ✓ Exceptionally unaffected by stray currents (1000 to 1 discrimination).

BRISTOL

FOR DETAILED PROOF *of the sensitivity, versatility and reliability of the electronic Dynamaster, use the coupon or write for Catalog P1245.*

The dependable Guidepost of Industry

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS



THE BRISTOL COMPANY
116 Bristol Road
Waterbury 20, Conn.

Please send catalog giving details of Dynamaster performance to:

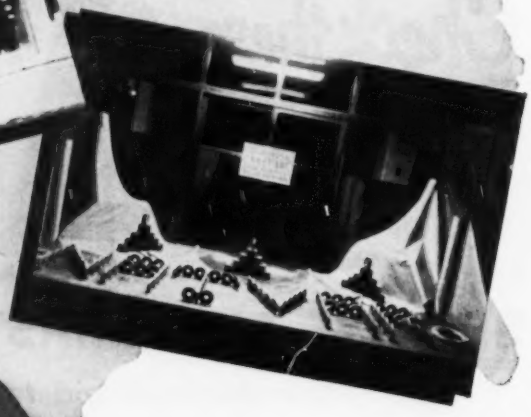
NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Patricio Sorde, S. A., Balderas 95, Mexico, D. F., leading distributor of electrical supplies and equipment, handles the complete Natvar line. In this attractive window display, rolls of tape are used to spell out the word "Natvar," and the sign in the window says "Natvar Products—The Best of their Kind." Principal standard items are stocked, and are available for immediate delivery.



NATVAR *in* MEXICO

Mexico's industrial growth in the last decade has been extremely rapid. Here, as in other principal industrial centers of the world, you will find convenient supplies of Natvar insulating materials made possible by the steadily increasing demand.

Users everywhere are standardizing on Natvar flexible electrical insulation because they have found it always the same, no matter where or when purchased.

If you need insulating materials with good physical and electrical properties, and exceptional uniformity, it will pay you to get in touch with your distributor, or with us direct.

Natvar

Natvar Products

- Varnished cambric—straight cut and bias
- Varnished cable tape
- Varnished canvas
- Varnished duck
- Varnished silk
- Varnished special rayon
- Varnished Fiberglas cloth
- Silicone coated Fiberglas
- Varnished papers
- Slot insulation
- Varnished tubing and sleeving
- Varnished identification markers
- Lacquered tubing and sleeving
- Extruded plastic tubing and tape
- Extruded plastic identification markers

Ask for Catalog No. 22

NATVAR CORPORATION

FORMERLY THE NATIONAL VARNISHED PRODUCTS CORPORATION

TELEPHONE RAHWAY 7-8800 — CABLE ADDRESS NATVAR: RAHWAY, N. J.

221 RANDOLPH AVENUE • WOODBRIDGE, NEW JERSEY

Transmission Towers by AMERICAN BRIDGE handle nation's first 330,000-volt line

● The first leg of the American Gas and Electric Service Corporation's projected high voltage transmission network has been completed with the construction of a 63-mi. 330,000-volt, double circuit link running from Appalachian Electric Power Company's Kanawha River, W. Va., station to its Philip Sporn plant.

The towers for this record-setting line were designed and fabricated by American Bridge as the result of valuable data gathered from the A. G. & E. sponsored 500,000-volt test line at Ohio Power Company's Tidd plant, Brilliant, Ohio, in cooperation with other manufacturers of high voltage transmission line equipment.

These towers are approximately 150 feet tall and carry 6 conductors of 1,275,000 C.M., A.C.S.R. expanded cable (1.6"OD). The towers are designed for straight-line spans of 1700 ft.

The technical knowledge and field experience American Bridge has acquired in this and hundreds of other transmission line installations may be just the answer to your tower problems. Our engineers welcome an opportunity to figure with you without obligation. Just write to the nearest office listed below.

AMERICAN BRIDGE DIVISION, UNITED STATES STEEL COMPANY
GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.
Contracting Offices in: AMBRIDGE · ATLANTA · BALTIMORE · BIRMINGHAM · BOSTON CHICAGO · CINCINNATI · CLEVELAND · DALLAS · DENVER · DETROIT · DULUTH · ELMIRA GARY · MEMPHIS · MINNEAPOLIS · NEW YORK · PHILADELPHIA · PITTSBURGH PORTLAND, ORE. · ROANOKE · ST. LOUIS · SAN FRANCISCO · TRENTON

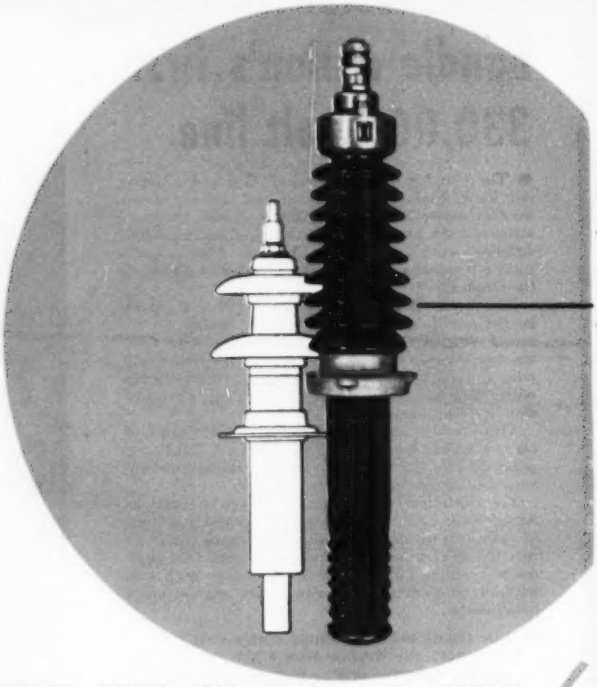
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

DESIGN REDUCES FOUNDATION INSTALLATION COSTS. Important savings in time, labor, and materials were made possible through use of steel grillage earth anchors and variable leg extensions as shown above. Many other simplified installation and frill-free construction features are obtained through American Bridge designs.

USS

AMERICAN BRIDGE

UNITED STATES STEEL



BETTER FOR TRANSMISSION AND SWITCHING, TOO

LAPP LINE POST

"All-time champion" among transmission insulators in point of service dependability at duty up to 69 kv. Its record, both on new construction and after reinsulation of lines to higher voltages, has been built on ability of Line Post to avoid leakage flashover, to withstand lightning arcover and mechanical attack, its inherent freedom from puncture and cracking.

LAPP STATION POST

In addition to the superior electrical and mechanical characteristics inherent in Lapp Post design, Station Posts also possess extra rigidity. Cap and base are externally attached for large-area low-intensity compression loading of porcelain, as contrasted to small-area, high-intensity loading of nested porcelain and metal parts in conventional pin-cap switch insulators.

LAPP FOG-TYPE SUSPENSION INSULATOR

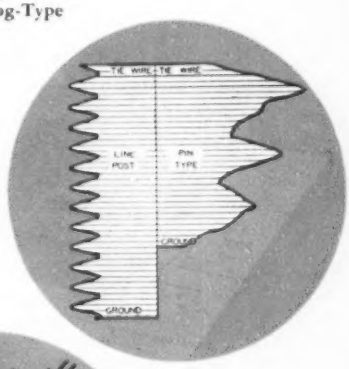
For high-voltage lines in areas of severe contamination—salt fog, industrial fumes, or dust—Lapp Fog-Type suspension units provide maximum leakage distance per length of string—and for greater effectiveness of leakage distance, inch for inch.

BETTER BUSHING DESIGN ?

It's been years since high voltage bushings have been built with the wide, spreading shells of old-time insulator design. Distribution fuses, switches, potheads, arresters, too, now use many short corrugations. Where did it all come from? Why, it's the Fog-Type design, pioneered some 25 years ago by Lapp as a notable improvement for all outdoor insulator applications. And nowhere is the improvement in performance more spectacular than in the case of insulators for high voltage transmission, switch and bus support. Superior performance of Lapp Line Post, Station Post, and Fog-Type Suspension insulators is due—in part—to two design superiorities of Fog-Type design.....

1 UNIFORM LEAKAGE PATH

Leakage flashover results from a contaminated surface which is not uniform—wet areas lower total resistance, so increase leakage current until voltage flashes over narrow shielded areas, precipitating flashover of entire unit. Compare developed uniform leakage surfaces of 66 kv Line Post (above, left) with that of conventional pin-type (right) where variation in conductivity is 3.6 times as great.



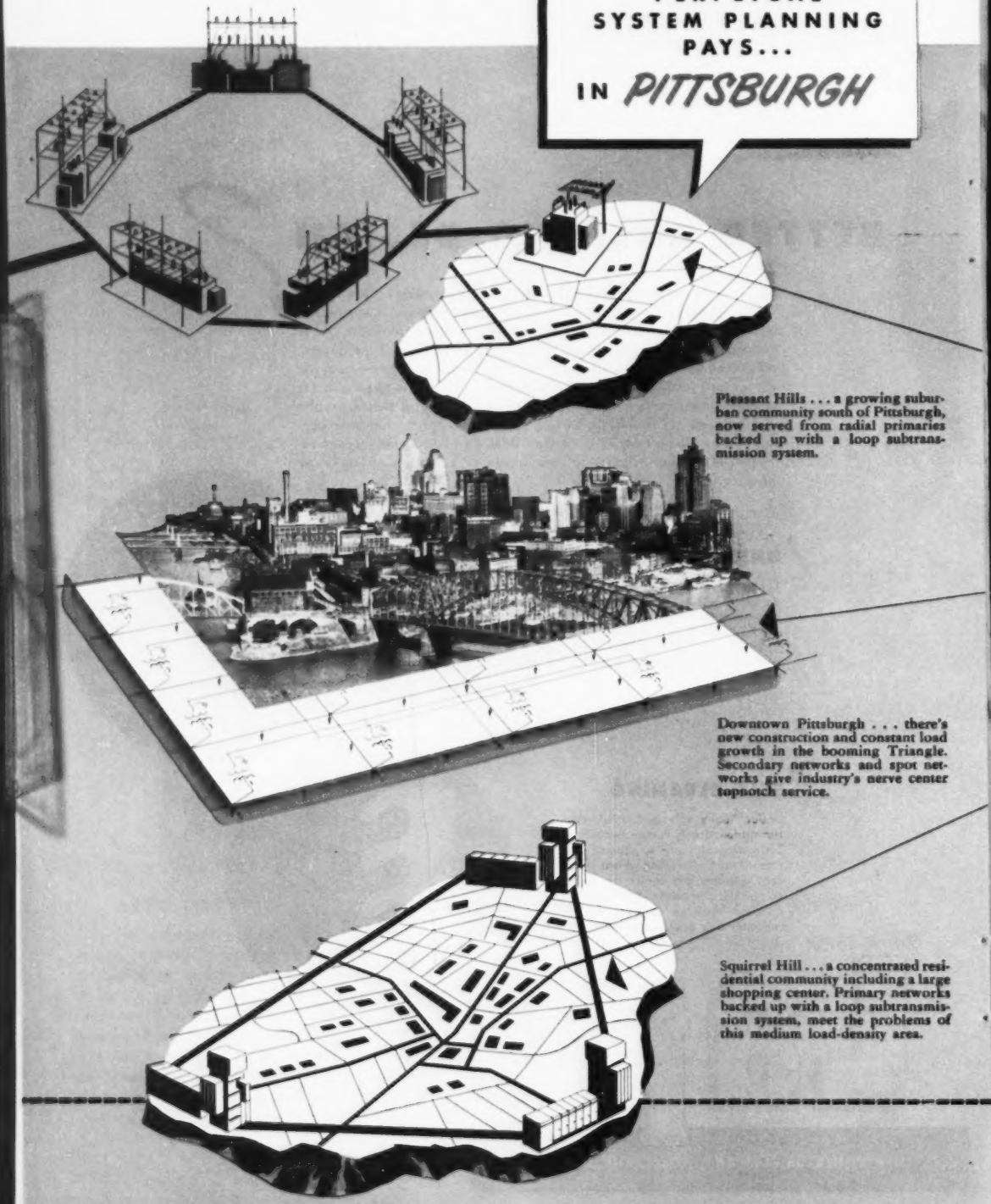
2 SELF-CLEANING

Under heavy rain and wind, contamination rapidly flushes away. Fog-Type petticoats are so shaped and spaced that rain falling on one petticoat splashes and cleans the under side of the one above. Resistance increases, leakage current falls—uniformly and over entire unit.

Lapp

LAPP INSULATOR COMPANY, INC., LE ROY, NEW YORK

PERPETUAL SYSTEM PLANNING PAYS... IN *PITTSBURGH*



Pleasant Hills . . . a growing suburban community south of Pittsburgh, now served from radial primaries backed up with a loop subtransmission system.

Downtown Pittsburgh . . . there's new construction and constant load growth in the booming Triangle. Secondary networks and spot networks give industry's nerve center topnotch service.

Squirrel Hill . . . a concentrated residential community including a large shopping center. Primary networks backed up with a loop subtransmission system, meet the problems of this medium load-density area.

"Simplified Systems

meet our load growth...
reduce distribution costs"

In Pittsburgh you'll find all the benefits from almost 30 years of sound system planning. Main benefit—complete flexibility to meet all load growth economically.

Duquesne Light Company take full advantage of the latest advances in the design and reliability of modern unitized electrical apparatus. Small blocks of power are integrated to improve their own unique Service Continuity Standards without uprooting the entire system.

CASE I Greatly increased load with subsequent voltage problems necessitated improved service continuity and the elimination of line losses for this suburban area. Proper system planning utilized a nearby subtransmission loop by installing a unit-type single-feeder substation. Pleasant Hills gets adequate service and costly field-erected substations are eliminated.

CASE II Secondary networks have provided Pittsburgh's Triangle with the highest quality of service since 1926. Badly congested primary feeders and small transformer installations were eliminated. Duquesne Light Company also offers the spot network form of the system for large commercial buildings. Sound planning enabled Pittsburgh to grow without any basic changes in the system.

CASE III 4 kv primary networks were installed in 1949 to economically meet the Service Continuity Standards for this medium load-density area. Careful planning based on load growth, income potential and geographic conditions dictated the necessity for a primary network system. Now, service continuity is high and there's complete flexibility to meet any increase or change in load density.

BECAUSE OF SOUND PLANNING, systems have been simplified, small blocks of power integrated, high service standards maintained, power distribution costs reduced. Westinghouse equipment and co-ordinated distribution apparatus have contributed to the ease and speed of change-over, dependability, and economy of this model operation. Use Westinghouse as your planning partner. Call us when you're ready to modernize. Start modern planning now!

J-97154

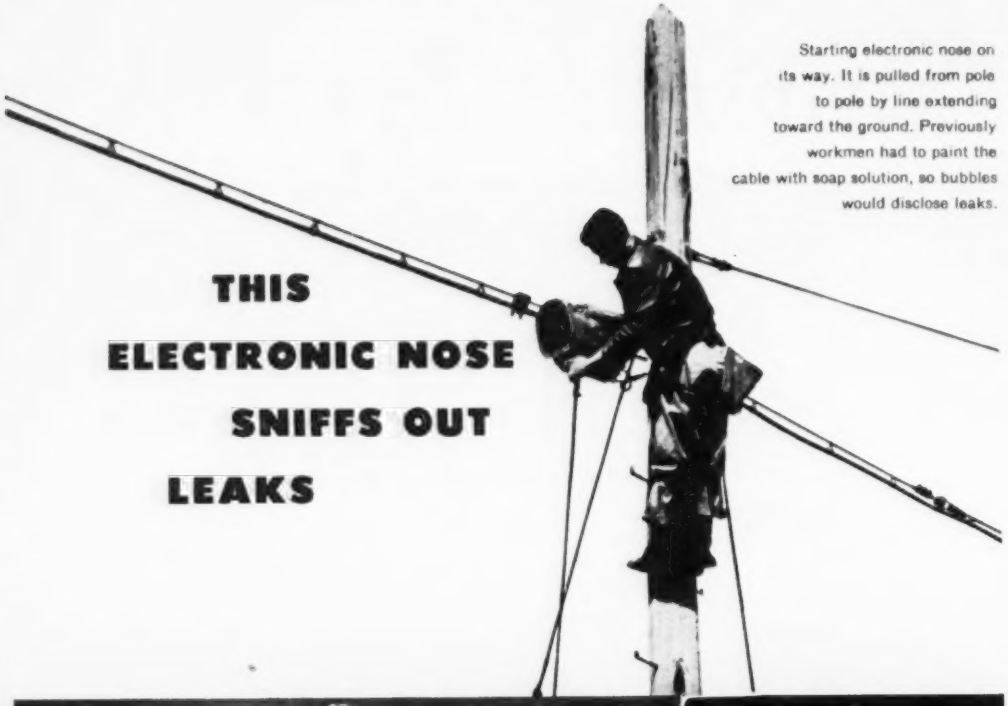
YOU CAN BE SURE... IF IT'S

Westinghouse

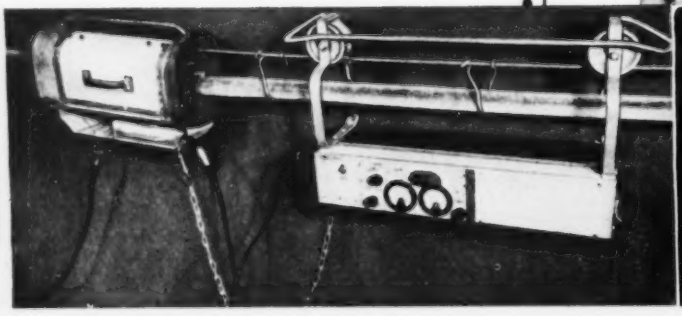
SYSTEM PLANNING SERVICE

WESTINGHOUSE

THIS ELECTRONIC NOSE SNIFFS OUT LEAKS



Starting electronic nose on its way. It is pulled from pole to pole by line extending toward the ground. Previously workmen had to paint the cable with soap solution, so bubbles would disclose leaks.



For test, the cable is cleared of protective nitrogen or air, and filled with Freon gas. Case at left collects escaping gas which operates Freon-sensitive detector underneath. At points where Freon escapes through sheath cracks, the box at right—a combined control unit and power supply—rings a bell. Workmen mark the point of leak for later repair.

After years of buffeting by the wind, even tough telephone cable sometimes shows its age. Here and there the lead sheath may crack from fatigue or wear through at support points. Before moisture can enter to damage vital insulation, leaks must be located and sealed.

To speed detection, Bell Laboratories scientists constructed an electronic nose which *sniffs* out the leaks. Using an electrically operated element developed by the General Electric Company, the device detects leaks of as little as 1/100 cubic foot per day. Sheath inspection can be stepped up to 120 feet per minute.

Thus Bell scientists add findings in other fields to their own original research in ways to make your telephone system serve you better. On the other hand their discoveries are often used by other industries. Sharing of scientific information adds greatly to the over-all scientific and technological strength of America.

BELL TELEPHONE LABORATORIES

Improving telephone service for America provides careers for creative men in scientific and technical fields

mechanically stronger sheath

greater resistance to fire, heat, oil, chemicals

firm, rugged assembly

HAZACORD®

CHALLENGES YOUR COMPARISON FOR

Long life... Low cost service

corrosion resistant conductors

higher breakdown voltages

maximum flexibility and toughness

Hazacord invites your comparison . . . for it's comparison alone that lets you see how HAZACORD QUALITY cuts costs on any flexible cord or portable cable installation.

Every Hazacord is protected by Hazard's exclusive Hazaprene ZBF sheath which means extra resistance to oils, acids, chemicals, moisture, weather. And the Hazaprene sheath is *cured under pressure in a continuous metal mold*—the best method known to provide "tire-tread" toughness with "snake-like" flexibility.

Like the rugged sheath, every Hazacord component—conductor, insulation and filler—is designed and made with the same skill. And every Hazacord, whether for light shop duty or tough mining operations, is assembled with precision and doublechecked for safety and performance even above rated capacity.

Compare Hazacord for quality—it's your best guide to longer-lived flexible cords and portable cables that mean *real* economy. Complete information on Hazacords for all uses is contained in the new 56 page Hazacord Bulletin, H-444; write for your free copy today. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pennsylvania.

HAZACORD *Mold-Cured* **portable cables**

1345

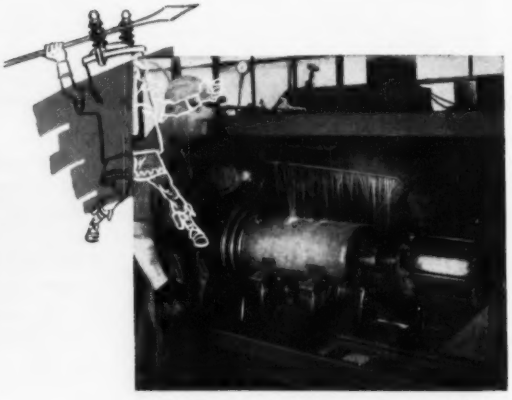
MOLONEY *HiperCore* BEST

The *"better performance"* that has come to be expected of Moloney HiperCore Distribution Transformers is not the result of chance. Rather, it is the result of long experience in the engineering, design and manufacture of transformers. This experience applied, resulted in the design of the HiperCore Transformer. Thorough testing of pilot models resulted in the transformer you receive when you order HiperCore.

But—this alone is not enough! To be sure that you get *"superior performance"* Moloney maintains a constant check during all stages of manufacture so that you know your HiperCore Transformer has been checked and double checked to insure the best operating performance possible.

Briefly, here are the testing steps every HiperCore Transformer undergoes before leaving the Moloney factory:

After the core-and-coil unit is assembled with necessary tap changers and other internal accessories, the completed unit is again tested.



All Moloney Transformer Tanks are individually pressure tested in a special spray machine before painting to make sure that they have no leaks.

MOLONEY ELECTRIC COMPANY

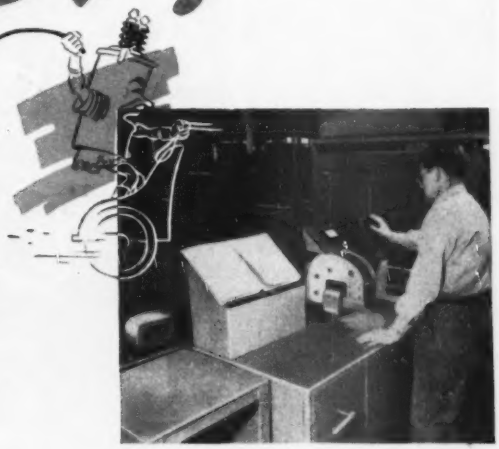
Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control

FACTORIES AT ST. LOUIS 20, MISSOURI AND TORONTO, ONTARIO, CANADA

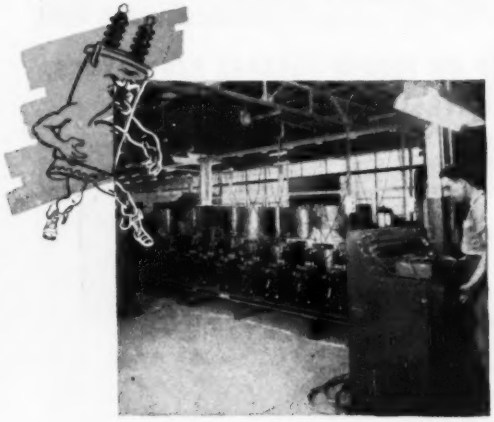
DISTRIBUTION TRANSFORMERS

BY TEST!

Each HiperCore coil is tested for the proper number of turns in each winding and each tap position before it leaves the winding department.



After cores are wound on automatic winding machines, they are annealed and impregnated, and then tested for hysteresis and eddy current losses both before and after they are cut.



Final, NEMA Standard Tests on all transformers; no load loss, exciting current, polarity check, ratio check, dielectric tests. Transformers above 200 Kva also receive load loss, impedance, temperature rise tests. ME92-30

A 3,600,000 volt surge generator, capable of applying surges equivalent to the most severe that will be encountered in operation, was instrumental in the development of the HiperCore design. Periodic sampling tests are made of transformers from the production line to insure quality control.

Because these tests are standard in the manufacture of HiperCore Transformers, they offer the following advantages:

1. **Surge-proved core-and-coil design**
2. **High short-circuit strength**
3. **Greater short-time overload capacity**
4. **Longer operating life**
5. **Less maintenance**
6. **Better voltage regulation**

Specify* MOLONEY *for better performance!

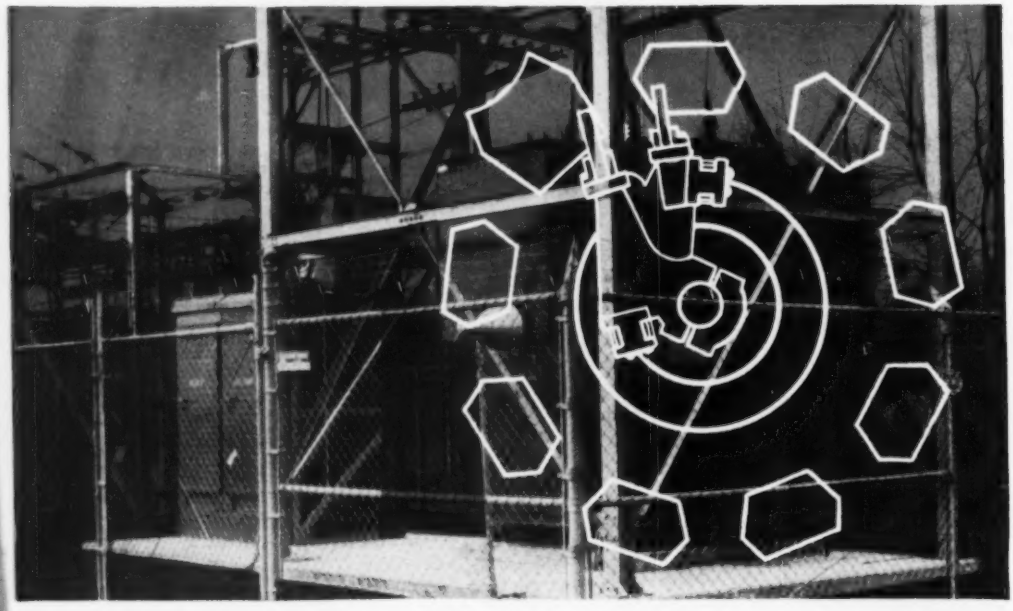
Transformers • Step Voltage Regulators • Unit Substations

MOLONEY ELECTRIC = { BETTER PERFORMANCE / GREATER RELIABILITY / LESS MAINTENANCE

SALES OFFICES IN ALL PRINCIPAL CITIES

ELIMINATE ALL ARCING

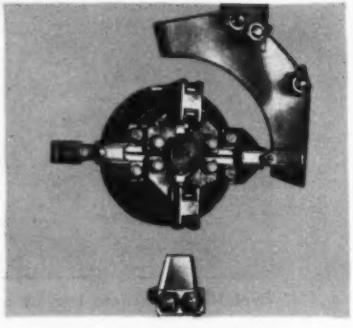
ON TAP SELECTOR SWITCH CONTACTS WITH . . .



. . . MOLONEY LOAD TAP CHANGERS PROVIDED ON FEEDER VOLTAGE REGULATORS, REGULATING TRANSFORMERS, LOAD RATIO CONTROL TRANSFORMERS

All Moloney Feeder Voltage Regulators, Regulating Transformers and Load Ratio Control Transformers are provided with Load Tap Changers which feature a load transfer switch to relieve the tap selector switch of all arcing duties. The load transfer switch has only four stationary contact tips per phase as compared with eighteen on the tap selector switch. This arrangement not only reduces the number of contacts subject to arc erosion, but also permits longer arc clearances to assure positive break of the arc. Liberal clearances of current carrying parts result in maximum capacity of the regulating equipment with minimum physical size. The load transfer switch, which is the only switch required to transfer load current, is provided with accelerating springs and is driven by Geneva gears. This assures quick break of the arc.

This is but one of the many features of the Moloney Load Tap Changer. This same sound basic construction is found in the regulating apparatus on which the tap changer is used.



Liberal clearances prevent establishment of an arc between adjacent current carrying contacts of the load transfer switch. Special alloy arcing tips prevent damage to the switch contacts as they are opened or closed.

MOLONEY ELECTRIC COMPANY

Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control Transformers Step Voltage Regulators • Unit Substations

MOLONEY ELECTRIC = BETTER PERFORMANCE / GREATER RELIABILITY / LESS MAINTENANCE

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONT., CANADA

The Company Must Train the Supervisor

Management includes the supervisor. On the job the supervisor is management. Men under him know intimately no other. His position is one of great responsibility in terms of men, equipment, and materials. To handle it he must be a specialist.

The supervisor, therefore, requires special training. He cannot get it at any school or college. Nor can he secure it by experience except over many years. Nor does he possess inherent abilities to perform his duties. He must be trained by the company.

For too long and in too many companies has the idea persisted that with an increase in pay, a title, and the congratulations of his superior there comes to the supervisor the ability to direct men in their work according to the policies of the company laid down by top management.

This may have been true 50 years ago, but such is not the case today. Now because of government regulations, union contracts, and advances in technology, the job of the supervisor is becoming more complex. He can no longer be left to acquire his training through experience. Now top management must make certain that he is quickly and thoroughly trained to do the work expected of him.

More and more companies are beginning to realize this. They are becoming aware that the supervisor is just as much of a specialist as the engineer, the accountant, or the advertising director. But while these specialists come to the company with some education for their jobs, the supervisor can get his training only from the company. That is why today one of the biggest, if not the biggest, jobs of industrial relations departments, themselves a creation of the last two decades, is training supervisory personnel.

To aid companies in setting up such programs, to help those which have them compare and re-evaluate them, Electrical World presents in this issue a special section on "The Supervisor's Role."

Although the articles in it were written by seven men outstanding in the field of industrial relations, no claim is made that this material tells the whole story or answers all the questions. But it does indicate that companies must train their supervisors to enable them to perform their management functions properly.

Sell—and Sell—and Sell

Now appearing in newspapers and the general trade press are opinions of leaders in consumer and capital goods industries indicating a generally optimistic feeling about business in the months ahead. They are seeing "a rosy glow in their crystal balls," to quote the Cincinnati "Times-Star." It seems that people are starting to buy again.

This is a pleasant prospect, indeed. It should, undoubtedly it does, spread happy smiles on the faces of makers of electric appliances and equipment, their distributors and dealers, and also the electric utilities. The people are buying again; goody, goody, we won't have to worry about selling. When things begin to come easy, effort tends to slacken off.

Since the war, there have been alternate periods of people buying and not buying electrical goods. The periods of buying were not the results of selling; the periods of not buying were the results of not selling. The ups and downs were simply responses to conditions and events outside the industry.

It is time for the electrical industry to take control of its own destiny, as much anyway as is possible in these troubled times. Better this than meekly to remain at the mercy of outside forces.

There is only one way to take such control. It is to sell, vigorously and continuously, the goods and services the industry offers to the people. The trouble is that when the people are in the buying mood, the industry feels it does not need to sell; then when the mood changes, the industry can't sell because it is not organized for the job. The obvious cure is to sell—and sell— and sell when the people are buying and to do the same thing when the mood changes. This is the way to assure that the present feeling of optimism will continue, not just for the months, but for the years ahead.

Safety Can be Inculcated

Some industrial plants are doing a better job in preventing accidents than the utilities are on the average. One industrial firm has, in 25 years, reduced injuries 93%—that is, from 10.3 per million man-hours to 0.67. Seventy-five of the company's 114 plants, laboratories, and construction projects completed 1951 without a single time-losing injury. Three have gone 22 years with a perfect record. The company built the Savannah River Project for the Atomic Energy Commission and put in 10,018,000 man-hours without a lost-time injury.

One plant has had 28 million man-hours of perfect record. If one man had lived long enough to do all that work he would have had to be born in 12,000 B.C. Another plant has a 17-million man-hour record. That carries a solo worker back to 8,000 B.C. and the early days of Egypt. Three dozen plants, in effect, have one of Caesar's Romans working still unhurt.

It is futile and beside the point to say that climbing a pole among live-wires is more hazardous than making explosives or tricky and flammable synthetics. There are dozens more varieties of mishaps that can occur in a far-flung establishment like DuPont, the one that has achieved these startling successes in safety, and years ago they did.

DuPont's accomplishment is told in "The Story of Safety". It is rightfully boastful but, far more, educational. It tells, largely pictorially, how the job is done by signs, safeguards, classes, work rules, safety belts, safety clothing, locks, finger dexterity, traffic measures, good housekeeping, and so on. Electrical World apologizes in advance to DuPont in case a flood of requests comes from electric utility safety directors. For this is one of the many groups that certainly should be interested in the accomplishments of a large manufacturer in the field of accident prevention.

Keep the Wife Informed

When it comes to business, some men tell their wives nothing. Some tell them everything. Some tell some things and conceal others. Of course, it is a man's personal business as to what he tells his wife. But if an electric utility man doesn't tell his wife about his business, the electric utility business, he is making a big mistake.

Among her friends the wife of a utility company employee is an authority on the company and the industry. Her views on public power, rates, house heating, appliances, or low voltage are accepted as gospel truth. What woman will believe the company ads or pronunciamentos of its president when Mrs Jones says just the opposite. "She knows. Her husband works for the power company." And let the men scoff at this feminine logic. It will do them no good. Women are rather stubborn about things which in their own minds they know.

So it is a sacred obligation for all men in the industry to tell their wives. Explain to them company policies. Give them the facts. Give them the company magazine. Discuss with them the industry's stand on public power. Our wives can be the industry's best friends and allies if we will take them into our confidence. And why shouldn't we?

Frank Watts

Frank Watts is dead. His indomitable spirit, housed through the past ten years in a body pain-ridden and crippled by arthritis, was forced at last to give up the battle and retire to a previously prepared position.

These words, "retire to a previously prepared position" are a classic euphemism used by military men to avoid saying they had been thoroughly licked. But they do not apply in that equivocal meaning to Frank Watts. His spirit, undefeated, moves now to a position from which it can not be dislodged.

That position is composed, but only partially, of the minds and hearts of those who knew him, who remember him with affection for his human qualities and with respect for his abilities. They, in their time, will pass on, and their memories of a good friend, a dedicated co-worker, will pass with them.

But the spirit of this man will remain, firmly fixed in the work to which he was devoted. It will remain in the Frank E. Watts Awards "for outstanding accomplishments in the promotion and sale of electrically operated farm equipment." But more securely than in memories of men, than in formal words, the spirit of Frank Watts lives on in the progress of farm electrification.

THE ELECTRICAL WEEK

The Issue's News Highlights—Supreme Court upholds Federal Power Commission on the "common carrier" clause it wrote into an Idaho Power Co. license for a transmission line across public lands.

Voters in Tacoma, Wash., decide to set up a five-man power board independent of city council.

A move by cooperatives to set up a public utility district in Jackson County, Ark., is defeated by a 4-to-1 vote.

Off the Washington Wire—FPC has extended for one year the preliminary permit held by Delaware River Development Co for investigation of a proposed $47-million hydroelectric project on the Delaware River in New York, New Jersey, and Pennsylvania.

Eleven Western state governors have been invited to participate in the dedication of Davis Dam on the Colorado River which will take place Dec. 10.

Yearly financial statement of Bureau of Reclamation shows that the bureau has spent $2.6 billion in the past 50 years in constructing 110 storage dams, 63 diversion dams and developing some 4.2 million kw of hydro capacity.

American G & E has announced it will start the third link of its 330-kv transmission network. The 156-mile line will extend from Lima, Ohio, to the Muskingum River Plant. A 47-mile link from this plant to the Philip Sporn Plant is under construction. The first 63-mile line from Sporn Plant to the Kanawha River Plant is now operating at 132 kv (EW, Oct. 13, p 22).

Labor—A 14-hour bargain in a session at which a wage dispute was resolved brought an end to the hard-fought 17-day strike at Detroit Edison. Four thousand operators and maintenance men at the utility will get a 6¢ wage increase, half of it retroactive to July 2 and the other half to Sept. 1, and will receive another 4¢ an hour in hospitalization and insurance benefits.

Allis-Chalmers expects its total sales to exceed one-half billion dollars for 1952. The company's president, W. A. Roberts, said the firm had a backlog of orders amounting to $350 million on its books, of which 30% were direct defense orders. Despite this, he stated, A-C would put greater emphasis on selling in 1953.

Rates—Ontario Hydro-Electric Commission will increase cost of power sold to municipalities in southern Ontario by an average of 14.8% beginning Jan. 1. Commission attributed increase to growing use of steam generation.

Commercial production of electric power from atomic reactors may be only four or five years off, Monsanto Chemical Pres Charles A. Thomas tells meeting of National Academy of Sciences. Dr Thomas anticipates "possibility of newly designed reactors, similar in some respects to those now in use, that will simultaneously produce plutonium for the atomic stockpile and electric power for civilian and industrial consumption."

Public vote on whether Barton, Vt., should sell its municipally owned power plant to Citizens Utilities has been put off until next spring. Scheduled to take place last week, the vote was postponed pending a study by a six-member committee of the utility's $200,000 purchase offer.

Construction—Northern States Power will spend over $7.5 million on new and enlarged lines and other transmission and distribution equipment to keep up with growing demand for power in Minneapolis-St. Paul area. About $5 million is being invested in distribution lines in the metropolitan area and the remaining $2.5 million will be paid out for three transmission and six distribution substations.

Illinois Commerce Commission authorizes Central Illinois Public Service, Illinois Power, and Electric Energy, Inc, to supply surplus power to TVA. Record drought in Tennessee Valley has caused power shortage in TVA system.

Commonwealth Edison reports that its engineers are using a "radar fault locator," weighing less than 100 lb, to locate faults in both overhead and underground high voltage transmission lines.

Financial—SEC approves final step in plan providing for dissolution of North American Co. The company will make three distributions to its stockholders over a two-year period. First two distributions will be made on basis of one share of Union Electric common for each ten of North American common. Final distribution will be on a share for share basis. Once plan becomes effective North American will cease paying cash dividends on its own common.

Washington State legislature, convening next January, will be asked by the Seattle City Council to pass a bill which would declare municipal public utility bonds to be negotiable instruments. The legislature will be asked to make the proposed law retroactive to Jan. 1, 1952 to benefit City Light bond issues placed on the market this year.

NEMA's new officers, elected at the association's annual meeting at Atlantic City, are: President—L. G. Hall, president, Stackpole Carbon. Vice Presidents—A. A. Berard, president, Ward Electric; J. W. Corey, president, Reliance Electric & Engineering; John L. Busey, vice president, General Electric; W. A. Elliott, president, Elliott Co; Hoyt Post Steel, executive vice president, Benjamin Electric. Treasurer—A. F. Metz, president, Okonite Co. Members at large of Officers Committee—Allen F. Sheldon, president, Kennecott Wire & Cable; J. H. Jewell, vice president, Westinghouse Electric.

NEMA's electric power connector group has initiated a study of all phases of making connections to aluminum conductors. Its aim is an application guide for the electric utility industry.

Congratulations—Kentucky & West Virginia Power Co elects R. E. Doyle, Jr, vice president. J. E. Wright is named vice president of Kingsport Utilities. Both executives are continuing as general manager of their respective companies, which are operating subsidiaries of American G & E.

Rep John Taber of New York . . . . . and Sen Styles Bridges of New Hampshire will be on hand in the appropriations committee to preside over a

Slowdown on Federal Power Spending

Expansion of federal power development will proceed more slowly under the new Republican Congress that takes office in January, but no flashy innovations are expected in legislative policy.

Best bet is the Republican majorities in both houses will accept the general policy that has grown over the past 50 years regarding federal power development. Changes will be in degree —not in kind.

The Eighty-Third Congress will probably:

- Vote less funds for hydroelectric projects and transmission lines.
- Show less enthusiasm for authorizing such controversial projects as Hells Canyon in Idaho and power redevelopment at Niagara—preferring to let these resources be developed by non-federal agencies.
- Keep tighter control over money appropriated for power development.

New lineup of committee chairmen, who furnish the real leadership in Congress, bears out this theory. Committees dealing directly with federal power development are headed, for the most part, by economy-minded men. However, there will be no wholesale scuttling of rivers and harbors or reclamation projects. These have far too much political appeal to permit the shaky Republican majorities in both houses to do much tinkering with them.

New head of the House appropriations committee will be Republican John Taber of New York, the budget-cutting lawmaker who held that post during the Eightieth Congress. Even with a Republican administration, Taber will probably require a lot more explanation from new officials of Interior Department before approving funds requested.

Bridges Astride Appropriations . . . On the Senate side, Sen Styles Bridges of New Hampshire takes over the appropriations committee from Democrat Kenneth McKellar of Tennessee. While less economy-minded than Taber, Bridges can still be expected to put the brakes on some government

REP GEORGE A. DONDERO will head the Public Works Committee in House and . . .

SEN EDWARD MARTIN will head the equivalent committee in the Senate

spending for power development.

Heading the House Public Works Committee, which must authorize many of the water power projects, will be Rep George A. Dondero of Michigan. Dondero is widely-known as a proponent of private power development wherever possible.

On the Senate side, Edward Martin of Pennsylvania takes over from liberal Dennis Chavez of New Mexico. Martin will probably go slow in approving new projects, and will hold his committee in line.

Rep Dean P. Taylor, New York Republican, will be chairman of the House Interior and Insular Affairs Committee which must pass on reclamation projects. As an Easterner, he probably will not be keen on many of the projects proposed. However, Western members will retain a majority on this committee and they are generally in favor of reclamation projects, regardless of party label.

Sympathetic Approach . . . In the Senate, Hugh Butler of Nebraska, who will head the Interior committee, is well-informed on reclamation and conservation works. He is expected to be generally sympathetic to such projects, but will probably want to put more emphasis on state and local control than does his Democratic predecessor.

One important task that the new Congress may take on is to dispose of some of the overlapping functions of the agencies dealing with power development. For instance, it may try to stake out more clearly the bounds for projects to be undertaken by the Army Corps of Engineers on the one hand and Bureau of Reclamation on the other.

SEN HUGH BUTLER of Nebraska will be chairman of the Senate Interior Committee

FPC's 'Carrier' Clause Upheld

High court says agency can impose conditions regarding lines of a private company that cross public lands

Decision upholds FPC on license granted to Idaho Power Co, reversing lower court decision favorable to the utility

Federal Power Commission has authority to impose limited "common carrier" conditions upon transmission lines which are part of a licensed project when these lines cross public lands.

The Supreme Court affirmed this authority in an opinion handed down Nov. 10 in the case of Idaho Power Co vs Federal Power Commission. Effect of the opinion is to uphold an FPC license granted the company in 1948 for its Bliss development on Snake River. The development includes a 138-kv transmission line from Boise to American Falls.

Affirmed Provisions . . . Disputed section in the license, now affirmed, requires Idaho Power to:

1. Make available any unused capacity on the Boise-American Falls line for use by the federal government.

2. Permit the government to expand capacity of the line at its own expense and use this capacity.

3. Reach agreement with government agencies as to reasonable cost for government use of the line or submit such controversy to FPC for settlement.

4. Give a 30-month notice before withdrawing any of the capacity being used by the government.

Interior Request . . . These conditions were included in the license at the request of Interior Secretary Oscar L. Chapman who administers public lands held by the federal government. He has sought to impose similar conditions on other transmission lines which are not portions of licensed projects.

Idaho Power contested these conditions charging FPC had no authority to impose them as a requirement to be met for a license.

A lower court sided with the company and ordered FPC to strike out the conditions and issue the license. FPC refused to do this and appealed to the Supreme Court, arguing that the lower court had no authority to issue such an order and that the conditions were within the authority held by FPC.

Reverses Lower Court . . . In a decision written last week by Justice William O. Douglas, the Supreme Court reversed the lower court, holding that the lower court had gone beyond its jurisdiction in not remanding the matter to FPC after disapproving the conditions. The high court also upheld the authority of FPC to impose the conditions.

Referring the Federal Power Act, Justice Douglas wrote:

"Under these sections the commission is plainly made the guardian of the public domain. The requirement that existing lines be fully utilized before additional lines are authorized would seem to be relevant to a decision . . . and the commission might well determine . . . that if public lands are to be used for the transmission of power, conservation of the 'water-power resources of the region' require that public power as well as private power be transmitted over them."

Cites Power Act . . . The high court found at least several sections of the Federal Power Act under which the limited "common carrier" provisions might be imposed. Wrote Douglas:

"Protection of the public domain, conservation of water power resources, development of comprehensive plans for the waterways—each of these might on the facts of a case be sufficient to authorize the grant of permission to a public utility company to use the public domain provided it agreed to use its excess capacity to transmit government power."

While this decision only affirms FPC authority to impose such conditions, it does lend weight to a attempt by Interior Department to write similar conditions in permits granted electric companies for lines crossing public lands. A lower court has already decided in favor of Interior in one such case.

PUD in Arkansas Voted Down

Jackson County citizens vote 4 to 1 against establishing public power district

Efforts to establish a public utility district in Jackson County, Ark., met with overwhelming defeat Election Day when voters turned back the public power proposal 4 to 1.

C. Hamilton Moses, chairman of Arkansas Power & Light Co, whose company led the fight against the PUD plan, declared the outcome was a "victory for freedom of enterprise over government ownership."

"Jackson County citizens," he said, "have decided they want freedom and opportunity not political control and nationalization of basic industry."

No Further Fight . . . Although a spokesman for Farmers Electric Cooperative Corp, whose management sponsored the proposal, called the defeat a "temporary setback" Corbett Johnston, president of the co-op, told Electrical World his organization had no plans to continue the fight for a PUD.

"We intend, however," Johnston declared, "to work for better electrification in Jackson County."

The vote in the Nov. 4 election was 4,770 for the PUD and 1,139 against it. Only five of the 49 voting precincts favored the measure.

During the weeks preceding the balloting, Farmers Electric and Arkansas P&L conducted vigorous campaigns to win the voters over to their respective sides. The PUD sponsors used radio and newspaper promotion to present their views and staged a series of "pie suppers" which attracted large crowds. The utility sent out about 50 selected salesmen to make house-to-house calls to tell its side of the story. Then shortly before the election the company conducted quiz programs on the radio at which Moses answered questions sent in by voters.

Opposition of Members . . . Arkansas P&L got an assist from members of the REA co-op which formed a group known as REA Protective Association to oppose the formation of a PUD.

The debate revolved around the question of rates. The PUD backers promised cheaper power if the public power district were set up and the company countered with a declaration that its wholesale rate to rural electric co-ops was the lowest offered by any utility in the nation.

"HAM" MOSES of Arkansas P&L answers questions sent in by voters on quiz program

Farmers Electric also accused the private company of "robbing and stealing" its customers. The charge is based on a Supreme Court decision which authorized the utility to serve an area, Gray's Addition, which had been annexed by the city of Newport. The co-op considered Gray's Addition its territory and claimed it had developed the area.

The company had offered to exchange territory with Farmers Electric to make up for the loss of Gray's Addition, but no agreement had been reached. A spokesman for Arkansas P&L said the door still remained open for exchange negotiations between the utility and the co-op but nothing is expected to develop in the next few weeks. The co-op also indicated it was interested in resuming the talks.

Philadelphia Utility Maps Smoke Control Program

Philadelphia Electric will spend $3.9 million to expand and accelerate its long-range smoke abatement program in the next five years, it was announced Oct. 23. This will swell the company's expenditures for air pollution control to a total of $7.4 million since it was started nearly 20 years ago.

The company said a large portion of the funds will be used largely to replace smoke abatement devices out-moded by new techniques utilizing the most modern types of smoke control equipment. The utility's broad program includes the installation of mechanical and electro-static precipitators.

These devices eliminate about 96% of the smoke-making solids from the gases going up the stack. Electric eyes detect the presence of any smoke-producing carbon and automatically sound an alarm which indicates an adjustment in fuel-air ratio is necessary.

A major development in Philadelphia Electric's research in the smoke-abatement field was a discovery that "fly ash," is valuable in making superior concrete products and also an insulating cement, known as "powerhouse" cement, on which two Philadelphia Electric employees have received patents.

Toledo Edison Has Plan to Conserve Engineers

Toledo Edison Co has established two new technical job classifications, technician, and senior technician, which are designed to release engineers from other assignments so they may work on strictly engineering matters. Toledo Edison men with two years of college engineering training or its equivalent will be given an opportunity to qualify for these positions.

The University of Toledo's College of Engineering has made up a series of examination questions which will be used as one basis for determining those qualified. The college will also administer the test and grade the examinations. Screening and gathering background information on applicants will be handled by the personnel department.

Qualifications for the new technical job classification include:

- Maximum age, 55.
- High school graduate plus two years of college engineering, or equivalent.
  (Completion of sufficient correspondence school courses in electrical engineering is considered as "equivalent."
- Employment by Toledo Edison Co for not less than five years.
- Satisfactory completion of examination to be conducted by the University of Toledo. Not more than three opportunities will be given to pass examination.

FPC Hearings . . .

. . . on New York Authority's application to build St. Lawrence power project set for Dec. 7

Federal Power Commission moved last week to help the United States keep its bargain with Canada in constructing the long-disputed St. Lawrence seaway project.

Hearings are set to begin Dec. 7 before FPC on an amended application by the Power Authority of the State of New York to build the U. S. portion of the power project on the St. Lawrence. The power project is a vital feature of the seaway project which is designed to bring ocean shipping to the Great Lakes.

After Congress had failed to act this year on full U. S. participation in construction of the navigational and power features of the seaway project, President Truman promised Canada he would seek to have some U. S. agency build a part of the power feature.

IJC Has Approved . . . Accordingly the International Joint Commission in late October approved plans for joint construction of the power project noting that a U. S. agency would have to be designated to build the U. S. share.

Power Authority of the State of New York now appears to be the most likely agency to carry out the bargain.

Since FPC agreed to reconsider the authority's application, a number of protests have been received along with several petitions to intervene in the hearings.

Almost certain to come up at the hearings are requests for a "preference clause" in any license which may be issued to the N. Y. Authority.

National Rural Electric Cooperative Association has petitioned to intervene in the hearings to request a preference clause.

The Protests . . . Those who have protested granting of a license to the N. Y. Authority or have asked to intervene in the FPC proceedings include:

Michigan Public Service Commission, National St. Lawrence Project Conference, St. Lawrence River Power Co, Aluminum Co of America, National Coal Association, United Mine Workers, State of Vermont and Lake Ontario Landowners and Beach Protection Association.

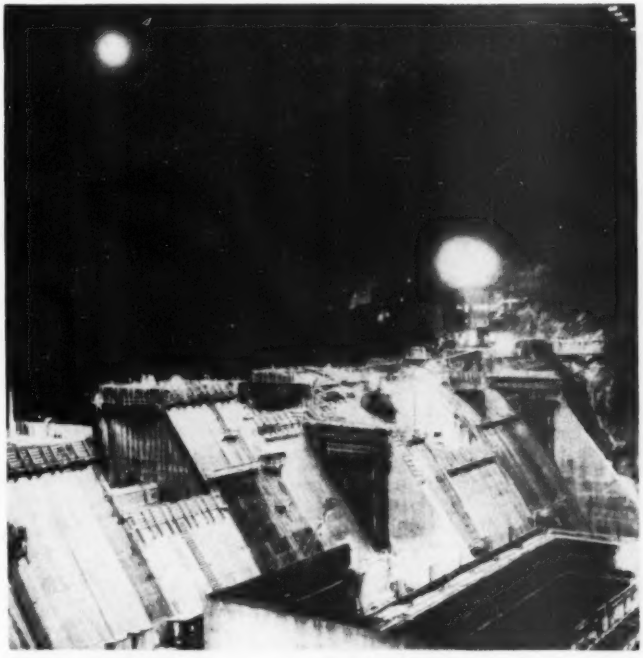
Also last week Canada let it be known that she has ruled out U. S. participation in construction of the navigation features of the project.

Ellis Hits Wilson Power Proposal as 'Chaotic'

What he calls "the big sell-out" of federal power projects to private owners has been listed as a new item of concern to the nation's electric cooperatives by Clyde T. Ellis, executive manager of the National Rural Electric Cooperative Association (EW, Sept. 29, p 7). Speaking at a series of regional meetings of the association, he rapped the proposal "crystallized" by Charles E. Wilson, former director of the Office of Defense Mobilization.

"The real danger," he said, "is not that these projects may be sold within the foreseeable future, but that this kind of thing may be used as propaganda to weaken the whole program to the point that (1) it may be still more difficult to begin new multipurpose projects, (2) still more difficult to obtain the self-liquidating transmission lines, and (3) still more difficult to keep TVA, Bonneville, and other power agencies building fast enough to meet the demand.

"Time does not permit a discussion," he continued, "of the utter chaos that would befall the American economy if Mr. Wilson's proposal were carried out."



Night Work at Canyon Ferry Dam

Working under floodlights and moonlight, construction forces are busy building forms for placement of concrete at Canyon Ferry Dam on the Missouri River near Helena, Mont.

The Bureau of Reclamation project is expected to be completed in the fall of 1953. The dam will have a height of 225 ft and a crest length of 1,000 ft. The building to house the power plant can be seen under construction in the right foreground. The plant will have a capacity of 50,000 kw.

In addition to power, the multipurpose project will make possible the irrigation of new areas and control of floods and silt.

Change at Tacoma City Light

Recently approved city charter provides that municipal utilities be run by a five-member board

Tacoma, Wash., has approved a new city charter which provides that City Light and other municipal utilities will be operated by a board virtually independent of the city council.

The utilities presently are directed by a commissioner of public utilities, elected by the people as a member of the council.

Five-Man Board . . . The new charter provides that the public utility board will be composed of five members, appointed by the mayor and confirmed by the council, for five-year terms. Members of the board may be removed only for cause by the mayor and council and "only after charges have been filed and published and the member has been given a reasonable opportunity to defend himself in an open public hearing before the council." Only compensation will consist of "reimbursement for expenses incurred in carrying out their official duties, other than those incident to attending board meetings held within the city."

The board will have "full power to construct, condemn and purchase, acquire, add to, maintain and operate the electric, water and Belt Line Railway utility systems," although "all matters relating to system expansion, the incurring of indebtedness, and the fixing of rates and charges" shall be subject to approval by the council.

The council is directed, at intervals not exceeding ten years, to order a general management survey.

Takes Office in June . . . The board, to take office next June, is empowered to appoint a director of utilities for an indefinite period, subject to removal, who in turn will appoint a superintendent for each utility system, subject to confirmation by the board.

The charter provides for a gross earnings tax maximum figure of 8% on utilities, an increase of one-half of 1% over the present tax. Other provisions call for the public sale of revenue bonds by sealed bids and a sharing by the utility and the general fund of the expenses of street improvements made necessary by readjustment of any utility.

Departments other than utilities would come under the direction of a city manager to be appointed by the council.

C. A. Erdahl, commissioner of public utilities, and J. Frank Ward, City Light superintendent, are likely to be considered for similar positions under the new charter.

Cab-Mounted Antennas Are Best, PEA Hears

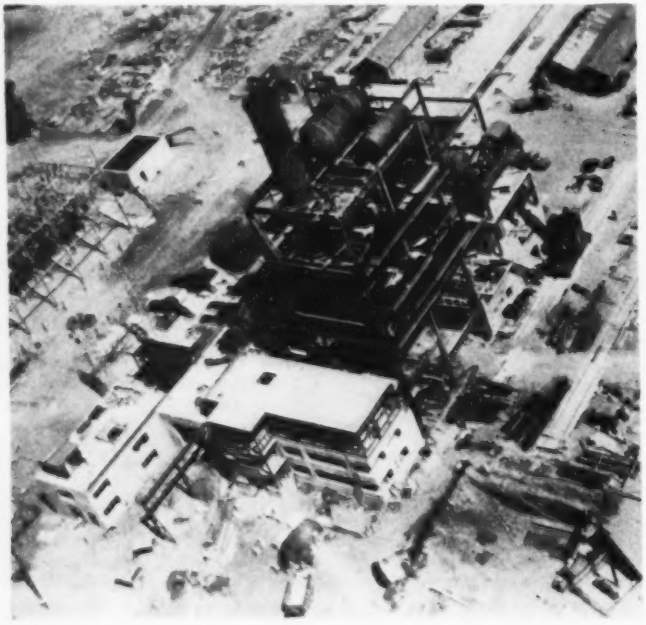
A radio antenna mounted atop the cab of a pickup truck with rack sides will give the best performance regardless of position of the automobile, according to Dr S. K. Waldorf, Pennsylvania Water & Power Co.

He spoke on "Radiation Patterns of Mobile Radio Units" at the Pennsylvania Electric Association Communication Committee meeting on Nov. 6 and 7 at Syracuse, N. Y.

Dr Waldorf said the cab mounting was found to be best after a study was made with an antenna at various locations.

Microwave system planning should include paths nearest roadways for availability even if higher towers are necessary, said E. W. Kenefake, General Electric Co. He said use of microwave transmission by utilities had grown from 2,000 miles in 1950 to 20,000 miles in 1952. He predicted a growth to approximately 100,000 miles in 1956.

Protective relaying channels by microwave require a power source not affected by system faults, stated F. C. Krings, General Electric. He believes a motor-generator set consisting of an ac motor, ac generator and a dc motor is the solution. Other power supply sources, he continued, are high voltage batteries, dc-ac motor-generator sets, ac-ac motor-generator set with throwover to a gas-driven generator, and ac service with throwover to a vibrator which is energized from dc source.



Oklahoma Plant Nears Completion

Construction of Oklahoma Gas & Electric Co's South Station is progressing rapidly. Plant is scheduled to go on the line in March 1953.

Maj Gen Sturgis . . .

. . . has been named Army Chief of Engineers to succeed Lt Gen Lewis A. Pick

Maj Gen Samuel D. Sturgis last week was appointed Army Chief of Engineers to succeed Lt Gen Lewis A. Pick, who will retire Nov. 30. President Truman named Sturgis from a selection board list of three candidates submitted by Army Secretary Pace. The Senate is expected to confirm the appointment soon after Congress convenes in January.

Sturgis at present is commander of the European communications zone. His arrival in Washington probably will be delayed beyond Dec. 1, Pace said. To fill the post during the interim, Pace appointed Maj Gen George J. Nold as acting chief. Nold is present Deputy Chief of Engineers.

Sturgis, now 55, is a 1918 graduate of the U. S. Military Academy. He became an engineer officer that year. As district engineer in Maine, he had charge of liquidating the controversial Passamaquoddy tidal power project during the late 1930's. Later he directed flood control work on the Mississippi and nearly $200 million of military construction in his area.

Moving next to the Southwest Pacific, Sturgis in 1942 became chief engineer of the 6th Army and for more than three years was in charge of a huge construction program for 23 amphibious operations from Australia to Japan. He took over his present European command last March.

NW Utilities Ask Conservation

Private companies appeal to housewives, retail, commercial users to cut power consumption at peak periods

In an effort to avert a second 10% cut in power supplies to large consumers, utilities of the Pacific Northwest have begun a campaign to induce all their customers to use less electricity.

The companies agreed last week to ask housewives, small retailers, commercial and business offices to curtail use of power in order to conserve waning hydroelectric reserves. Conservation will be asked especially during the morning and evening peaks.

A 10% curtailment effective Nov. 17 for all firms using more than 8,000 kwhr weekly is estimated to save 110,000 kw. But if stream flows continue at present "critical" levels, power supplies will be 200,000 kw below normal. Unless the voluntary program results in substantial savings, or rainfall increases streamflow, large users will have to face a further curtailment.

Private power companies of the area are planning appeals to state regulatory authorities for permission to make emergency rate increases. Since the public utilities get first call on Columbia River power, the private companies have had to buy more expensive steam-generated power. Costs of Puget Sound Power & Light Co, Pacific Power & Light Co, Portland General Electric Co, and Washington Water Power Co are reported to have been increased a total of nearly $2 million a month.

New Power Source . . . Meanwhile, initial power from Hungry Horse Dam in Montana was linked into Bonneville Power Administration lines Nov. 6, adding 40,000 average kw to the Pacific Northwest's pooled power system. BPA reported limited use of Hungry Horse power will make it possible to keep an interconnection between Montana, Utah and Idaho surplus areas and the power-short western group of Washington-Oregon at fully loaded operation.

Current storage at Hungry Horse is only one-fifth of ultimate storage when the dam is completed, but BPA said the output will be increased through the winter to meet western group pool peak loads.

Limited operation of a second Hungry Horse generator is tentatively scheduled for early December. The output plan provides an additional 47,000 kw schedule in December from downriver storage at Cabinet Gorge, Grand Coulee, Rock Island and Bonneville hydro plants.

Utah, Idaho and Montana steam and hydro surpluses provide about 85,000 kw for export to the western group. Hungry Horse and downstream use of the storage draft will boost the western import to about 135,000 average kw later in the year.

California Plan . . .

. . . for developing water resources of Feather River moves ahead

California's plan for a $1.2-billion development of the water resources of the Feather River recently made news on two fronts.

Most important was the news from Washington that Interior Department will not oppose the state's plans.

Meanwhile, in Sacramento the California Water Project Authority voted to ask the state legislature for an additional $750,000 to further—the completion of investigations of the proposed project.

Funds Available . . . The legislature already has approved $800,000 for investigative work for the current fiscal year. If the new funds are granted they would become available next July 1.

State Engineer A. D. Edmonston was advised from Washington that Acting Secretary of the Interior Vernon Northrop notified Federal Power Commission that Interior has no opposition to state construction of the Feather project.

The state has pending before the FPC an application for a permit to develop power on the river.

Northrop, in his communication to the FPC, said land withdrawn from public entry in the Feather River watershed by the Interior Department will be turned over to the state if California's license request is granted.

Army Corps Study

Engineers will consider the use of nuclear power reactors to fill some service requirements

Army Corps of Engineers, which builds many of the federal multipurpose projects, will study the possibility of using energy from nuclear reactors to fill certain Army requirements for electric power.

This preliminary study is aimed at determining the exact nature of the Army requirements that might be filled by power generated by nuclear fuel.

The Engineers will work closely with Atomic Energy Commission, which is developing the most suitable nuclear reactor for producing electricity.

Col James B. Lampert will represent the Chief of Army Engineers in carrying out this study. He will serve in a liaison capacity to AEC, working under Dr Lawrence Hafstad, director of AEC's Reactor Development Division.

It is generally conceded that nuclear-fueled electric generators will not, in the immediate future, be a serious competitor to large coal-fueled plants. However, it is thought power reactors may be feasible in isolated places where transportation of fuel is expensive and energy requirements are moderate.

The Army Engineers are studying military requirements to see if there are likely locations for nuclear-fueled plants.

Engineer Chief Lewis A. Pick said the potential savings in fuel transportation costs alone, in supplying electric power to overseas forces during a war or emergency, may be very large. He said the corps will "give high priority to this study and will push it vigorously."

Col Lampert, who will serve as liaison man with AEC, was executive officer for Lt Gen Leslie R. Groves, head of the wartime Manhattan Project which developed the first atomic bomb.

Changes in Capacity Reported to FPC

PLANT ADDITIONS DURING SEPTEMBER

State	Utility	Plant	Fuel	Capacity (Kw)
Vt.	Central Vermont Public Service Corp.	Gas Turbine	S	5,000
Mass.	New England Power Co.	Salem Harbor	S	75,000
Mass.	Taunton Municipal Light Plant	Taunton	S	10,000
Pa.	Pennsylvania Electric Co.	Front St.	S	50,000
Minn.	Northern States Power Co.	Black Dog	S	60,000
Iowa	Pella Municipal Power & Light Department.	Pella	S	4,000
Iowa	Rockford Municipal Light Plant	Rockford	IC	488
Iowa	Ft. Dodge Des Moines & Southern Railroad Co.	Ft. Dodge	S	2,500
Mo.	Carthage Water & Electric Plant.	Carthage	IC	3,000
N. D.	Northern States Power Co.	Bison	S	6,000
S. D.	Burke Light & Power Department	Burke	IC	240
W. Va.	Monongahela Power Co.	Albright	S	66,000
N. C.	University Consolidated Service Plants	Chapel Hill	S	10,000
Fla.	Gulf Power Co.	Pensacola	S	30,000
Okla.	Oklahoma Gas & Electric Co.	Woodward	IC	175
Tex.	Robstown Lighting & Power Department	Robstown	IC	2,050
Idaho	Washington Water Power Co.	Cabinet Gorge	H	50,000
Wyo.	Bridger Valley Electric Association, Inc.	Mountainview	IC	1,076
Wyo.	Bureau of Reclamation	Boysen	H	7,500
N. Mex.	Public Service Co of New Mexico	Person	S	20,000
Calif.	San Diego Gas & Electric Co.	Silver Gate	S	50,000

PLANT RETIREMENTS DURING SEPTEMBER

N. Y.	Bath Electric Gas & Water System	Bath	IC	2,721
Ohio	Columbus & Southern Ohio Electric Co.	Delaware	S	600
Ill.	Public Service Co of Northern Illinois	Oregon	H	120
Minn.	Worthington Municipal Public Utilities	Worthington	S	1,250
Mo.	Carthage Water & Electric Plant.	Carthage	IC	850
Md.	Southern Maryland Electric Cooperative, Inc.	Leonardtown	IC	155
Mont.	Superior Electric Light & Water Works	Superior	H	8

H—Hydro, IC—Internal Combustion, S—Steam

United States Capacity as of Oct. 1—Hydro, 19,593,861 kw; Internal Combustion, 2,083,846 kw; Steam, 57,079,838 kw; Total, 78,757,545 kw.

1st Pump Turbine...

. . . to be installed in United States is ordered by TVA for Hiwassee Dam in western North Carolina

Tennessee Valley Authority has announced plans for the installation of a reversible power unit, or pump-turbine, at its Hiwassee Dam in western North Carolina. Generating capacity of the unit will be 58,000 kw.

According to the announcement the pump-turbine installation will provide substantially more dependable power capacity than would be possible by using a conventional-type unit. Contract for the equipment has been awarded to the Allis Chalmers Manufacturing Co at a cost of $1,216,775.

Dual Function . . . The new unit is designed to function both as a turbine and as a pump. For such an installation to be feasible, certain conditions have to exist—all of which are or will be present at Hiwassee:

- There must be a pond, or reservoir, into which the unit can discharge water when generating and from which it can pump water when desired.
- First cost of structures and equipment must not be excessive.
- Power generated during periods of highest use must have considerably more value than cost of power available from system at other times.
- An ample supply of moderate-cost off-peak generating capacity must be available whenever needed.

When Hiwassee was built, one conventional-type generator was installed. Space was left for a second unit. The pump-turbine ordinarily will be capable of generating power at a rate of 58,000 kw. When functioning as a pump, it will be able to lift one and three-quarter million gallons of water a minute a height of 205 feet.

First in U. S. . . . Although reversible units of this type are in operation in other countries, none is at present in use in the United States. One such unit is being installed at the Flatiron Plant of the Colorado-Big Thompson project and other installations are planned. Included in the latter is the proposed pump-storage project at Niagara Falls.

However, none of those planned thus far approaches the size of the unit planned for Hiwassee.

SEE SALES CONFERENCE Chairman E. C. Easter, center, vice president of Alabama Power Co, shown at meeting with Vice Pres B. K. Wickstrum, Sylvania; and Pres John C. Sharp, Hotpoint, Inc.

SEE PRESIDENT Hal Leonard, left, vice president of Gulf States Utilities, posed with Dr Kenneth McFarland, General Motors Corp; and John W. Talley, executive director of the regional group

Utility 'Sales' Problem: Win Friends

The electrical industry, says SEE's Hal Leonard, has not been doing a very good job of it. He suggests a remedy

American industry, including the electric utilities, are doing a very bad sales job of "winning friends for industry," in the opinion of Hal Leonard, president of Southeastern Electric Exchange and vice president of Gulf States Utilities Co.

Leonard addressed the SEE Sales Conference in Birmingham, Alabama, October 29-31. He urged that each company take steps to place its house in order and inform its employees about the threat of public power encroachment. He said utilities should make their stand clear especially to those who talk with customers.

Utility people should rededicate their lives to the ideal of service and make themselves known and respected for their efforts in the public interest, according to Lewis M. Smith, president of Alabama Power Co.

He said this requires an honest-to-goodness guiding policy. This policy, he said, must deal with service, customers, stockholders. It must set forth what the company hopes to achieve and how it will affect and benefit the public as individuals; identify it with the long range good of America and the general welfare of the human race.

Coordinated Selling . . . In those areas where utilities are actively merchandising, or are participating in dealer cooperative programs, the selling effectiveness of appliance retail outlets has increased sharply, according to John C. Sharp, president of Hotpoint Inc. He said the utility and appliance industries profitably can consider coordinated marketing programs that will create stronger alignment and close relationship.

The antipathy many utilities have toward merchandising is entirely unwarranted, in the opinion of J. P. Newsome, president of Watts-Newsome, Inc.

He said that the average dealer cannot afford to handle an appliance until the utility has promoted it and developed a 20% saturation.

Set Minds Back . . . Management of the utility industry must go back to the frame of mind that characterized them 25 years or more ago, when they were determined sales leaders and builders, said B. K. Wickstrum, vice president of Sylvania Electric Products, Inc.

Once that is accomplished, he said, the problem of the salesmen will be much less difficult to handle. He said utilities can't get salesmen because they don't pay them well enough. Sales money well spent will not only bring in the revenue, but it will stimulate a sales department and keep the men with the company, he added.

The real secrets of effective house heating with electricity are the reduction of heat losses by the effective use of construction methods and materials and the installation of small, thermostatically-controlled electric units in each room, said C. W. Cheatham, Alabama Power Co. He said the average cost of a heat pump installation is the same as a conventional fuel furnace plus summer air conditioning equipment.

"The heat pump of the future will cost less to purchase, will cost less to operate, and will have electrical load characteristics substantially better than today's models." This was the prediction made by H. M. Brundage, General Electric Co. "It eventually will come down to a mass-market price," he said.

Residential load building activities must be considered in the ratio of their cost to the revenue they will produce, said C. A. Harrison, Toledo Edison Co, in discussion of the need for greater promotion of electrical living. There is little agreement among electric utilities on what that ratio should be. Harrison reported a range from 0.6 to 3.7% of gross revenue among 37 power companies.

Detroit Edison Co obtains annual revenue of $1.2 million from the 55,000 clothes dryers on its lines, according to a paper by E. E. George, presented by Paul Penfield. Since March, 1950, the company has been actively engaged in promoting this appliance.

"MR AND MRS 50,000," otherwise Mr and Mrs Russel Peterson, pose with sons, Randy, 4; and Barry, 8 months. In the background Manny Aros, oldest employee, installs gold-plated meter

Tucson Adds 50,000th Meter

Company entertains "Mr and Mrs 50,000" at a celebration which marked 50 years of utility service to the community

Installation of its 50,000th meter recently gave Tucson Gas, Electric Light & Power Co an opportunity to tell its customers it is one of the nation's fastest growing companies on a percentage basis. The company has doubled the number of meters in service since 1947. The occasion also marked 50 years of service to the community.

A special public relations program was built around the installation of a gold-plated meter at the home of "Mr and Mrs 50,000". The lucky couple, Dorothy and Russel Peterson, was determined several days in advance by a forward projection of applications for service. To highlight the event they were given a variety of electrical appliances.

Donated by Westinghouse Electric Corp, the meter was presented formally during installation ceremonies by J. L. Winters, distribution sales manager for the western division, to John H. Saunders, senior vice president, director, and electrical production superintendent for the power company. Then it was installed by Manny Aros, the company's oldest employee in length of service.

Installation ceremonies were attended by company officials and representatives of Westinghouse Electric Corp and Westinghouse Supply Co. It was covered by local radio stations and both local newspapers to assure widespread publicity. A tape recording of the event was later broadcast over Tucson's four principal AM radio stations.

Ceremonies Broadcast . . . Broadcast included introduction of the Petersons as Mr and Mrs 50,000, presentation to them of electrical appliances, and reading of a congratulatory telegram from Tucson GEL&P's president, J. R. Snider. As build-up to installation of the 50,000th meter, listeners were told the Tucson utility is installing meters at the rate of one every 17 min to keep up with the 12.5% customer growth, about four times the national average. New $127,000 substation and a $14 million generating station expansion program were cited as examples of the company's foresight in providing for continued growth.

Following the installation ceremonies, the party of 40 toured the new Country Club & Speedway Substation and lunched at the Old Pueblo Club. They continued on to inspect DeMoss-Petrie Station where a two-year expansion program is underway to quadruple the company's generating capacity.

Gifts presented to the Petersons included a portable electric sewing machine, electric blanket and sheet, automatic toaster, waffle grille, mixer, fruit juicer, portable radio, roaster-oven, and automatic iron.

Centennial Celebration of N. Y. State E&G Ends

New York State Electric & Gas Corp, which was founded Oct. 28, 1852 as the Ithaca Gas Co, has completed its Centennial Celebration. The occasion was observed throughout the entire system area which covers central and southern New York.

At Ithaca a special celebration was held in connection with the groundbreaking for a 500,000-kw steam plant on Cayuga Lake, north of the city. The plant has been named in honor of Arnold W. Milliken, vice president and general manager. The first unit of 135,000 kw is expected to be ready in 1955.

Entertainment at the 15 employee birthday parties held throughout the state included orchestra music and singing of songs popular in each of the ten decades. At the opening party at Ithaca a dramatic skit reenacted the formation of the company and the lighting of the first gas and the first carbon-arc street lamps. This and speeches by company officials were recorded and replayed at the other parties.

WASHINGTON COMMENT

JESSE MOCK

Rooting out the idea of "whole hog federal government" is the major task that falls to the Secretary of Interior who serves in the administration of Dwight D. Eisenhower.

It is to resource development—particularly hydroelectric development—that the Eisenhower phrase, "whole hog," is most obviously applicable. Under the 20-year rule of the Democrats, the federal government has moved into practically every phase of the electric utility field.

In a series of speeches in October, Eisenhower deplored the empire-building of the Interior Department, foremost proponent of the paternalistic role of the federal government in power development and marketing. Besides building some of the hydroelectric projects, various agencies of Interior are charged with marketing the power from most of the government-built projects. In connection with its marketing activities, these agencies have built huge transmission networks in the northwest and elsewhere.

As a substitute for the "whole hog" idea, Eisenhower pledged he would rely on private initiative and local-state-federal cooperation to develop the nation's resources. It will fall mainly to the new Secretary of Interior to carry out this pledge.

Tough Going Ahead For New Secretary . . . The most competent and aggressive man that Eisenhower can choose will have tough going in the task assigned him. He will have to try to reverse a tradition that has been 20 years a-building and overcome obstacles that may be placed in his way by the outgoing Truman administration.

Immediate problem facing the new Secretary when he assumes office will be to find a staff of assistants to replace the present appointees. This means a new undersecretary and several assistant secretaries. Reclamation Commissioner Michael Straus has already announced he will be leaving when the new administration takes over, and his successor will have to be named.

Down the line there will be new men named to head power agencies such as Bonneville Power Administration, Southeastern and Southwestern Power Administrations.

Changing Budget Will Be Difficult . . . Second problem facing the new Secretary will be to determine what changes need to be made in the fiscal 1954 budget for the Interior Department. This budget will be completed and submitted to Congress before the new administration takes over. Changes which the new Secretary may wish to make will probably have to be suggested in amendments submitted to Congress during the first few months of next year.

Although Eisenhower has agreed to have a representative sit in with the Director of the Budget in shaping the fiscal 1954 requests, there is no hint that the representative will be given authority to change the requests.

Even if allowed a full voice in final budget requests, it is an impossible task at this point to make drastic changes in the budgets of all the executive departments. Best that can be hoped for is that the Eisenhower representative will obtain a grasp of the budgets of the more important departments such as Defense and State.

The new administration will have an opportunity, however, to control government spending in fiscal 1954. In that manner, it may put a damper on some of the schemes for which the retiring Truman administration requests funds.

Only after the personnel and budget problems are under control will the new Interior Secretary have an opportunity to study possible changes in administrative policy.

It may be expected that these changes will come slowly and in a manner that will cause the least possible disruption to orderly administration. Yet over the next four years, there are bound to be some significant changes as the new administration steers away from the idea of "whole hog government."

TECHNICAL NOTES

ARCHER E. KNOWLTON

Power plant ashes and steel mill slags are likely to be processed some day to retrieve the rare elements they contain.

Laboratory reproducibility of conditions associated with equipment failure in the field is halfway on the road to the corrective.

Outage frequency should be the same on the company president's street as elsewhere. Perfect reliability is too expensive to establish anywhere.

Unit substation acceptance is a testimonial to the respect for reliability of the three-phase transformer.

Reheater drains should, if they discharge to the condenser, be left open until 5-10% rated steam flow has been established. If they discharge to the atmosphere they should be left open until it is time to start the hogging jets of the condenser.

Shallow trenches for buried cable can be an invitation to insect trouble. Depth should be more than 2 or 2½ feet.

High-voltage dc cable would be an asset to higher voltage transmission because it would dispel the incubus of distributed capacitance.

One grid will before too many years embrace all of the United States and Canada. Focus will have to be on the protective facilities.

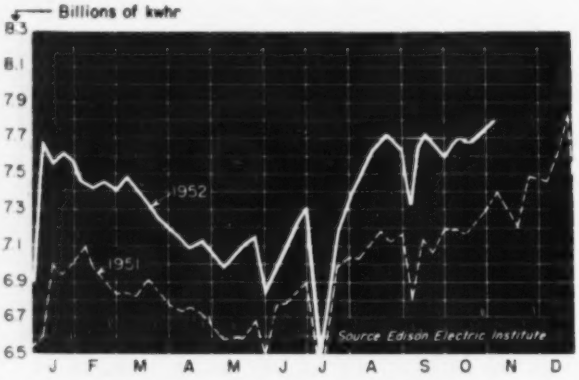
Conductive flooring need be only a moderately good conductor to dissipate static electricity and prevent spark hazards.

Skin has a steady resistance of about 200,000 ohms 20 minutes after applying voltage at ⅛ inch electrodes separated by ⅛ inch. A blister is likely to form under the negative electrode after 15 minutes of 20 microamperes. At 1,000 cps the ac impedance is about 20,000 ohms.

Fluorine is the only element more electronegative than oxygen.

Per customer investment apportionment on one nonmetropolitan company is 32.5% in generation, 24.8% in transmission, 37.3% in distribution, 5.4% other segments.

STATISTICS



Output Week Ended Nov. 8—7,806,795,000 Kwhr

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Nov. 8	+5.6	+11.6	+3.4	+4.9	+6.7	+7.4	+10.1	+6.3	—4.4	+8.4
Nov. 1	+5.9	+8.7	+4.0	+6.2	+5.9	+8.6	+5.6	+6.8	—4.4	+10.7
Oct. 25	+6.4	+10.6	+4.8	+5.9	+8.8	+10.2	+5.8	+6.9	—6.4	+10.3

Electric Power Statistics

		Latest Month	Preceding Month	Year Ago
Peak Load (Million Kw)	Aug.	69.8*	67.2	64.4
Capacity (Million Kw)	Sept.	78.78	78.31	74.29
Production (Billion Kwhr)	Sept.	33.38	34.36	30.25
Hydro		7.36	8.52	7.03
Fuel		26.02	25.84	23.24
Fuel Consumption				
Coal (Million Tons)	Sept.	8.82	8.57	8.60
Oil (Million Barrels)		6.03	5.38	5.06
Gas (Billion Cu Ft)		97.37	104.97	77.34
Sales (Billion Kwhr)	July	27.70	27.67	26.50
Residential		7.50	7.44	6.55
Commercial		5.30	5.00	4.70
Industrial		12.64	13.20	13.13
Other		2.25	2.03	2.12
Net Income Class A & B Companies ($ Million)	Aug.	68.67	64.62	53.33
Estimated Dec. 52 Peak (Million Kw)	Aug.	80.0	80.1	79.7
Kwhr per Residential Customer (12 Month Average)	Aug.	2,119	2,104	1,947
Revenue per Kwhr Residential Service (12 Month Average)	Aug.	2.77¢	2.78¢	2.83¢
Canadian Production (Billion Kwhr)	Aug.	4.97	4.84	4.60

Business Statistics

FRB Industrial Production Index†††	Sept.	228	218	223
Gross National Product Annual Rate ($Billion)	3rdQtr.	344.0	343.2	337.1
E. W. S Industry Production Index	Sept.	123.5	120.5	123.5
ENR Construction Cost Index††	Oct.	123.3	122.9	114.6
BLS Consumer's Price Index	Sept.	190.8	191.1	186.6
NEMA Insulation Materials Sales Index†	Aug.	451	470	539
NEMA Electric Appliance Sales Index†	Aug.	236	234	210
NEMA Household Refrig. Sales Index†	Aug.	148	197	97
Metal Prices, (Nov. 11)				
Copper, Conn. V., lb		$ .24½	$ .24½	$ .24½
Lead, N. Y., lb		.14 1/5	.13½	.19
Zinc, prime Western E. St. Louis, lb		.12½	.12½	.19½
Tin, Straits, qual. N. Y., lb		1.21¼	1.21½	1.03
Aluminum, ingot, base price		.20	.20	.19
Nickel, base price		.56½	.56½	.56½
Steel, billets, Pitts., ton		59.00	59.00	56.00
Steel, scrap, No. 1 heavy, Pitts., ton		45.00	45.00	45.00

* Estimated † 1936=100 †† 1949=100 ††† 1937-39=100 (Unadjusted)

4.2% of Married Couples Maintain No Households

Only about 1.5 million (4.2%) of the 36.5 million married couples who are living together are not maintaining their own households.

That married couples who are sharing quarters of others or are living in hotels, rooming houses, or other quasi-households has decreased since 1947 at an average rate of over 260,000 couples per year is borne out by the advance results of a survey by the Bureau of Census.

This measure has frequently been used as an indicator of housing demand. Changes in this measure since the outbreak of the Korean War reflect to some extent the fact that it excludes married women not maintaining a separate household while their husbands are in the service.

The bureau also reports that close to 70% of all American households are located in urban areas, while 20% are in rural—non-farm areas and the remainder in rural farm areas.

Millions of Married Couples

		With own household	Without own household	
			Number	Percent
April 1952	36.5	35.0	1.5	4.2
Urban	24.1	23.0	1.1	4.5
Rural nonfarm	7.1	6.9	0.2	2.8
Rural farm	5.3	5.0	0.3	4.9
April 1951	36.0	34.3	1.7	4.9
March 1950	35.9	33.9	2.0	5.6
April 1949	35.3	33.2	2.2	6.1
April 1948	34.3	31.8	2.5	7.2
April 1947	33.4	30.5	2.9	8.6
April 1940	28.5	26.6	1.9	6.8

Since 1950, the bureau estimates, households located on rural farms have probably represented a smaller proportion of all households than at any other time in the history of the country. Comparable figures for years before 1950 are not available however because of changes in the definition of a farm.

The number of school-age children in the United States, the bureau reports increased by more than one million in the 15-month period ending July 1, 1951.

The large increase in the school-age population in this short period reflects primarily the considerably greater number of births in the post-war period from April 1945 to June 1946 than in the depression period from April 1932 to June 1933.

The West had the largest relative increase, but all regions contributed an almost equal share.

FINANCIAL

New Block to Puget-PUD Deal

Court order restrains Kitsap PUD from participating in purchase before Nov. 24. Hearing will be held on that date

Another road block has been thrown in the path leading to PUD purchase of the Puget Sound Power & Light Co by a restraining order which prevents the Kitsap PUD of Bremerton, Wash., from participating in the purchase before Nov. 24.

A hearing will be held on that date before Superior Judge H. G. Sutton at Port Orchard on whether the order should be made permanent. The temporary order was obtained by C. E. Ferguson, who won election to the Kitsap PUD board Nov. 4 on a platform opposing the purchase.

When Ferguson takes office Dec. 1, foes of the purchase will be in a majority on the three-man board, incumbent J. W. Bryan long having opposed the deal. Ferguson won by a big majority over incumbent C. Jack Jones, who favored the purchase.

Act Called Unconstitutional . . . Ferguson alleged in his suit that the legislative act of 1949, which authorized the six PUD's jointly to purchase the private power company, is unconstitutional. He maintains the State Supreme Court never has ruled on the merits of this act. When this court heard argument on the act early in 1950, it ruled only on the legality of the title of the legislative act, he asserts. Ferguson argues further that no deal was pending at that time.

The State Public Service Commission's approval of the deal is invalid because it lacks authority to approve the sale of private power company property to a group of PUD's, Ferguson further contends. The purchase itself is declared illegal since it includes an agreement for the PUD's to assume responsibility for paying pensions accruing to Puget Power employees. This would constitute an illegal diversion of public funds to defray obligations of a private firm.

Chairman's Retort . . . Commenting on the suit, Harvey Benson of Anacortes, chairman of the six-district board arranging the purchase, declared "It's evident every attempt is being made to stop the deal."

Should a decision in the case be delayed until after Dec. 1, the Kitsap PUD very likely will withdraw from the $107-million transaction. Such a withdrawal might wreck the entire deal, as Kitsap's share—$28,285,000—is larger than any other district's.

Ferguson appears to be the only anti-purchase commissioner elected Nov. 4, with Skagit, Thurston, and Jefferson Counties endorsing candidates who favor the purchase.

The PUD's had hoped to conclude the transaction by Dec. 1 and already had named their joint power agency the Puget Public Power System, with offices in Seattle. The bonds were to be purchased and handled by a combination of firms headed by John Nuveen & Co, Chicago, and B. J. Van Ingen & Co, New York.

Injunction Denied . . . In an earlier development Judge Edward J. Hanify of the Suffolk County, Mass., Superior Court denied a temporary injunction sought against Puget Sound P & L by two minority stockholders of Puget.

These stockholders contend there is a counter-offer by Washington Water Power Co which wants to merge Puget into its system.

Previously the court had stated that despite the ruling to be made it would set the case down promptly for a hearing on its merits. As the judge handed down the injunction decision no mention was made of a hearing date.

Regulatory Bodies Approve Idaho Power Rate Boost

Approval of an upward rate adjustment for Idaho Power Co by regulatory authorities in Idaho, Oregon, and Nevada will provide an estimated 11% increase in company gross revenues. Increased rates become effective with the October billings.

Rate increase is the first in the company's 36-year history. In granting the adjustment, Idaho Public Utilities Commission observed that since 1940, wage increases to meet increased living costs have amounted to 119% for journeyman linemen and personnel engaged in equivalent employment. Transportation costs per mile have increased 121%, and replacement cost of vehicles has increased 225%. Increased costs of materials and supplies used in daily operations range from 36 to 297%.

As to taxes, the commission said, "For the year ended May 31, Idaho Power's taxes ($5,502,100) chargeable to operations exceeded by almost a half million dollars the aggregate of all its other operating expenses combined."

Idaho Power encountered virtually no opposition in its application for an increase.

FINANCIAL BRIEFS

Niagara Mohawk Power Corp has acquired the franchise and distribution system of the Edwards Electric Light & Power Co . . . **Property-owning residences** of Hempstead, L. I., have approved by a vote of 11-to-1 the sale to Long Island Lighting Co of the town's Anderson Island 38-acre tract for $160,000. The company plans to erect $100-million steam plant on the property . . . **Indiana & Michigan Electric Co** has asked Security and Exchange Commission approval to increase the authorized common shares to 2.5 million shares from the present limitation of 1,250,000.

Jasper, Ind., City Council has approved plans to improve and boost capacity of municipal power plant at a cost exceeding $2.5 million . . . **American Gas & Electric Co** will pay in addition to the regular quarterly cash dividend of 75¢ per share on its common stock an extra dividend in the form of stock at the rate of one share for each 40 shares now held. The cash dividend is payable Dec. 10 to holders of record Nov. 10. The stock dividend is to be payable Mar. 10, 1953, to holders of record Feb. 2, 1953. The company's board of directors voted to recommend a split of the common stock on the basis of 2-for-1 and called a special meeting of shareowners to be held on Jan. 27, 1953, for the purpose of voting thereon. Both the stock dividend and the proposed split-up are subject to Security and Exchange Commission approval.

Today in Utility Finance

YIELDS (%)

Quality	Bonds			Preferred Stocks			Common Stocks		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
DATE									
1952									
Nov. 6	**2.98**	**3.03**	**3.17**	**4.04**	**4.28**	**4.59**	**5.22**	**5.53**	**6.04**
Oct. 30	3.00	3.05	3.18	4.06	4.27	4.60	5.28	5.61	6.16
3rd 1952	2.99	3.03	3.16	4.10	4.26	4.61	5.18	5.50	5.96
2nd 1952	2.95	3.00	3.09	4.05	4.31	4.60	5.38	5.85	6.42
1st 1952	2.95	2.99	3.13	4.11	4.29	4.66	5.35	6.03	6.47
4th 1951	3.02	3.07	3.21	4.32	4.50	4.91	5.42	6.18	6.84

Data: Reis & Chandler, Inc.

EARNINGS

Company	Period Months	Ended	Net Income 1952	Net Income 1951	Earnings Per Common Share 1952	Earnings Per Common Share 1951
Arkansas-Missouri Power	12	Sept.	$679,577	$564,545	$....	$....
Central Illinois Electric & Gas	12	Sept.	1,903,295	1,712,012	2.30	2.12
Central Illinois Public Service	12	Sept.	5,340,026	4,931,362	1.55	1.47
Columbus & Southern Ohio Electric	12	Sept.	4,409,955	3,652,667	1.98(a)	1.89(a)
Consolidated Gas Electric Light & Power of Baltimore	12	Sept.	9,872,077	9,093,595	1.77(b)	1.65(b)
Delaware Power & Light	12	Sept.	3,392,348	3,458,975	1.66	1.78
El Paso Electric	12	Sept.	1,533,003	1,427,421	1.92	1.78
Kentucky Utilities	12	Sept.	4,223,284	3,882,871	....	....
Lake Superior District Power	12	Sept.	923,150	811,874	....	....
Michigan Gas & Electric	12	Sept.	452,630	402,355	2.87	2.49
New Jersey Power & Light	12	Sept.	1,381,429	1,144,933	....	....
Pacific Power & Light	12	Sept.	4,275,561	3,409,907	....	....
Pennsylvania Water & Power	9	Sept.	1,022,157	935,281	1.79	1.98
Public Service of Colorado	12	Sept.	6,809,972	6,776,517	2.05(c)	2.04(c)
Public Service of Indiana	12	Sept.	9,819,868	8,071,056	2.42(c)	2.25(c)

Notes—(a) Based on 2,001,360 shares in 1952 and 1,701,360 shares in 1951; (b) Based on average shares outstanding during the period; (c) Based on 2,750,900 shares in 1952 and 2,745,145 shares in 1951; (e) Based on 3,712,835 shares in 1952 and 3,249,247 shares in 1951; (f) Based on 500,000 shares in 1952 and 360,000 shares in 1951.

FINANCING

Company and Description	Amount of Offering ($000)	Offering Price	Yield to Public
WEEK OF NOVEMBER 6-12			
Preferred Stock			
British Columbia Electric—5% cum	$5,000	$47.50	5.26%
Common Stock			
Pacific Gas & Electric—78,684 sh (Owned by the North American Co. It was acquired when North American Utility Securities Corp, a former subsidiary, was dissolved)	$2,911	37.00	5.41
WEEK OF NOVEMBER 13-19			
Bonds			
Long Island Lighting—1st mtg 3¼% 1982	$17,000	.....	.....
SCHEDULE FOR NOVEMBER TO DECEMBER			**Bid Date**
Bonds			
Gulf States Utilities—1st mtg 1982	$10,000	.....	Nov. 24
Florida Power Corp—1st mtg 1982	15,000	.....	Dec. 3
Debentures			
Consolidated Gas Electric Light & Power—conv. 1967 (to be offered to commonholders on basis of $100 debenture for each 30 shares of common, record about Dec. 1)	$16,484	.....	.....
Preferred Stock			
Commonwealth Edison—1,150,000 sh conv. (to be offered commonholders on 1-for-12 basis, record Nov. 24 to expire Dec. 10)	.....	.....	.....
Common Stock			
Hawaiian Electric—50,000 sh (being offered commonholders on 1-for-10 basis, record Oct. 3 to expire Nov. 26; no underwriting)	$1,000	$20.00	10.00%*
Duquesne Light—250,000 sh#	.....	.....	Nov. 20
Cleveland Electric Illuminating—557,805 sh (to be offered commonholders on 1-for-5 basis, record Nov. 24 to expire about Dec. 19)	.....	.....	.....
UNSCHEDULED AND UNDER CONSIDERATION			
Bonds			
Central Maine Power—1st general mtg	$6,000	.....	.....
Toledo Edison—1st mtg	7,500	.....	.....
Central Hudson Gas & Electric—1st mtg	6,000	.....	.....
Ohio Power—1st mtg	22,000	.....	.....
Kansas City Power & Light—1st mtg	12,000	.....	.....
Preferred Stock			
Ohio Power—100,000 sh $100 par	10,000	.....	.....
Common Stock			
Central Maine Power	$5,000	.....	.....
Toledo Edison—500,000 sh	.....	.....	.....

Notes—* Dividends are subject to 2% Hawaiian withholding tax. If this tax is deducted, the yield would be 9.80%. # 170,000 shares will be sold by Philadelphia Co and 80,000 shares will be sold by the company as "new money."

REGULATION

New Jersey Board of Public Utility Commissioners has announced it would hold a hearing at Newark on Dec. 15 on a proposed $1.4 million a year general rate revision by the New Jersey Power & Light Co . . .

A general industrial rate revision filed by the Metropolitan Edison Co has been suspended by the Pennsylvania Public Utility Commission for six months until May 1.

Ohio Valley Electric Corp and its subsidiary, Indiana-Kentucky Electric Corp have received Securities and Exchange Commission approval for financing the construction of two electric generating stations (2.2 million kw and costing $370-440 million) to serve Atomic Energy Commission's gaseous diffusion plant near Portsmouth, Ohio.

CALENDAR

American Institute of Electrical Engineers
Special Technical Conference on Electrically Operated Recording and Controlling Instruments, Benjamin Franklin Hotel, Philadelphia, Nov. 17-18; Winter General Meeting, Hotel Statler, New York, Jan. 19-23, 1953.

National Association of Corrosion Engineers
Western Region, 2nd Annual Conference, Biltmore Hotel, Los Angeles, Nov. 20-21.

New Jersey Utilities Association
Annual Meeting, Seaview Country Club, Absecon, N. J., Nov. 21.

American Standards Association
34th Annual Meeting, Waldorf-Astoria Hotel, New York, Nov. 25.

American Society of Mechanical Engineers
Annual Meeting, Statler Hotel, New York, Nov. 30-Dec. 5.

20th National Power Show
Sponsored by American Society of Mechanical Engineers, Grand Central Palace, New York, Dec. 1-6.

Public Utilities Advertising Association
Winter Meeting, Region 2, Claridge Hotel, Atlantic City, N. J., Dec. 4-5.

***Interstate Power Club**
Hotel Martinique, New York, Dec. 8.

Institute of Radio Engineers
Joint Electronic Computers Conference with American Institute of Electrical Engineers, Park Sheraton Hotel, New York, Dec. 10-12; Joint High Frequency Measurements Conference with AIEE, Statler Hotel, Washington, D. C., Jan. 14-16, 1953.

Canadian Electrical Association
Eastern Zone; Engineering Division, Nova Scotian Hotel, Halifax, N. S., Jan. 15-16, 1953; Sales Division, General Brock Hotel, Niagara Falls, Ont., Jan. 22-23, 1953; General Division, Mont Tremblant Lodge, Mont Tremblant, Que., Jan. 29-30.

***National Rural Electric Cooperative Association**
11th Annual Meeting, Civic Auditorium, San Francisco, Jan. 26-29.

***Addition this week.**

The Supervisor's Role In . . .

Your Industrial Relations Program

JOHN C. ARNELL, Senior Assistant Personnel Director
Consolidated Edison Co of New York, Inc

The supervisor's role in today's industrial relations is the outgrowth of an industrial evolution that has accelerated during the past generation. Initially, business was based upon a proprietor who usually worked directly with his few employees, and frequently ate with them. There was no need to be concerned about supervisor problems. **Employees talked with the boss and learned first hand about his business problems.** His problems were their problems, and they were willing to help.

As production expanded and more employees were hired, the personal separation of employee and employer began. The advent of mass production brought greater centralization of more and more employees under the corporate form. The personal association was lost.

In the modern corporation, management is represented to the employee by his immediate supervisor. Improved employee communication systems are necessary to bring the employee and management into closer harmony.

However, a communication system needs a message. **It is top management's responsibility to tell the supervisor what its thinking and policy is.** It also has to see that employees clearly recognize the supervisor as its agent in carrying out management policy. Simply passing policy matters to the supervisor for interpretation and execution without appearing in the picture at all does not tend to build up respect or to clothe him properly with authority.

Present day management in the typical utility company can be likened to a team of three squads. The first is top management, with the final authority to say "What" is to be done within the framework of the corporate obligation to owners and consumers. The second is middle management —the administrative group with authority to say "How" the "What" is to be done. The third is the supervisory group. This squad is equally essential to the whole team as the other two. Its function is to get the job done—see that the "How" is carried out on schedule to accomplish the "What." It is this third squad that we want to discuss.

The growth of industry has brought an increasing complexity of problems with which management has had to cope. Government influence, particularly in the electric

utility business, has made itself felt in many ways. At the same time unionism has come of age. These developments have created a progressive interest in corporate industrial relations programs as a means whereby management can get across its story to employees and to the public.

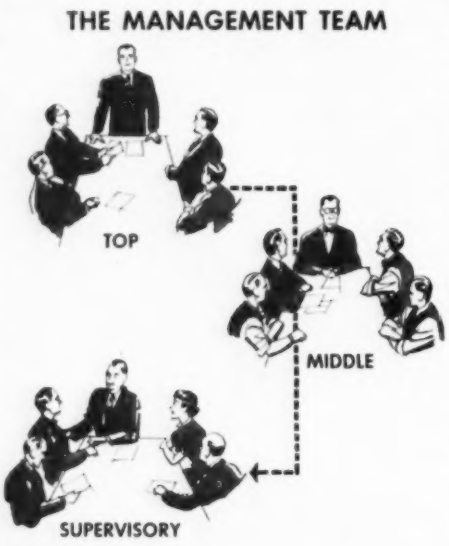
The public utility industry has its own peculiar problems in addition to the industrial relations problems common to most industries. To the public in general the utility is a monopoly and is expected to do with and for its employees what no other industry would be expected to do.

Consequently, it is essential that a utility's industrial relations policy not only be well known to all its employees but also be tied in with its public relations policy.

Many matters come within the broad meaning of "industrial relations." **Industrial relations is that function of management which has to do with policies affecting management-employee relations.** The primary objective of an industrial relations program, therefore, is to develop and maintain the best possible understanding between management and employees. It must establish an adequate, efficient employee body doing its job with a high degree of employee satisfaction at a reasonably low overall labor cost. Do this, and a good share of the public relations problems will also be taken care of.

Because the supervisor plays a large role in putting across management's industrial relations program to the employees, let's take a closer look at him.

With the industrial evolution there also has been an evolution in the supervisor's principal duties. Specialization has taken away some of his planning functions. Growth of companies together with complications and new problems introduced by legislation have made it necessary that numerous administrative functions be handled by others specially trained. The supervisor's prime function is to get the job done—not by swinging a big stick or driving, but by being a leader. The supervisor in leading not only will have his group produce efficiently but also will have them understand and work within the industrial relations program of the company.



Such a supervisor is the voice and personality of management. He must be familiar with the law relating to employee and labor relations, act as the voice of management, understand his workers, make decisions about hours and working conditions, settle grievances, interpret the contract, and get his basic job done.

There are many individual characteristics that management looks for when selecting a supervisor. Most deal with his ability to handle people. As a leader, he must have a genuine human interest in his workers and an ability to obtain their respect. He must have initiative and reasonable technical skill in his particular field. His judgement must be sound, backed up by intelligence, education, and knowledge of the job and of the company's policies. He must have self-control and be fair and tolerant in his dealings. His cooperative attitude toward the company must be shown by his interest in company objectives and his efforts to see that these are attained.

Beware of These Supervisory Pitfalls

The most significant part of a supervisor's job is to win and keep the confidence and respect of his men.

No leader should attempt to dominate or be overbearing. A bossy supervisor cannot expect to hold the cooperation of his people.

Public reprimanding of an employee does more harm than good. On the other hand, a supervisor does not hesitate to reprove an employee privately, when justified, merely because he thinks that the action might make him unpopular.

The supervisor must never procrastinate. Delay or neglect on his part in carrying out his duties and responsibilities will quickly give the impression that he does not know what it is all about.

Failure to make decisions is another weakness often mistaken for procrastination. Since the supervisor must act consistent with company policy, he is tempted to avoid the possibility of mistakes by failing to act. Management can help the supervisor overcome this weakness by clearly enunciating company policy and by effectively supporting his actions.

Insincerity can quickly cause employees to lose respect for a supervisor. A supervisor should never say what he does not mean, promise what he cannot accomplish, or make decisions based on emotions.

And finally, nothing can break down the morale of a group more quickly than to have the supervisor show discrimination or favoritism in his treatment of the individuals in his group.

Once management has added an individual to the supervisory team, it has a continuing responsibility to help him be an effective teammate. The key to success is to keep him adequately and currently informed. But first, his supervisory status must be made explicit. He should have clearly delegated authority including these rights: To suspend employees in disciplinary matters requiring investigation; to hear and adjust grievances at the initial stage; to expect management support in maintaining amicable local union relations; and to recommend promotions, transfers, increases, etc, for his workers.

No supervisor can be efficient without an adequate knowledge of the company's policies. Management must train each supervisor in fundamental company policies. The supervisor must be kept up to date on personnel procedures and policies and significant sections of the collective bargaining agreement. He also must be acquainted with interpretations of labor legislation as they apply to his daily duties. The wise supervisor also will record his experiences in the daily application of the contract, such as grievances settled, decisions made, or any problems he has run across during the contract year. Management should encourage the supervisor to report upstream on these experiences.

Another way to help supervisors is to have them take an active part in periodic discussion meetings attended by top management where major company policies and problems can be critically reviewed.

More companies are now helping their supervisors by supplementing details about the company with background information on economics, finance, and human relations.

If management will follow some persistent program of taking the supervisors into its confidence, keeping them informed, seeking their opinion, and backing them up in their union relationships, they will be developed into an effective force, interested in management's affairs, willing and able to carry out management's policies and to interpret them effectively to the employees.

When there is a job to be done, the smart supervisor will instruct his employees completely on what, how, and when it is to be done, not overlooking some clue as to the whys. He will give them all the facts that will help them to do the job better. It is his responsibility to see that the work is laid out, that adequate tools and supplies are available.

When it comes to discipline, or when reprimanding a person for careless work, the supervisor must temper his criticism so as not to engender resentment.

Conversely, the supervisor must be ready to recognize outstanding performance and give justified credit avoiding insincere and indiscriminate praise.

The way a supervisor handles a grievance can have an immediate effect on an employee's attitude toward the company. The supervisor must be open-minded and listen sympathetically to an employee's grievance. He should try to put himself in the employee's position, render a fair, prompt decision, and give his reasons for it. If any corrections of a situation or condition are involved, the good supervisor must initiate the necessary steps to that end and follow them through to a reasonable conclusion.

The supervisor can play an important part in union relations. **The effective supervisor is management-minded.** He is as much the day-to-day representative of the management as the union steward is of the employees. He can go a long way toward maintaining cordial relations by showing fairness and tolerance in his union dealings.

The supervisor can enhance the respect in which he is held by making sound decisions and demonstrating that he knows his job. If he makes a mistake, a frank acknowledgement is always respected. Attempts to cover up only weaken his position in the eyes of everyone.

The list of things that a supervisor must do, or watch, if he is to do a good job is almost endless. Likewise the things he should avoid are numerous. But the wise supervisor never forgets to follow the Golden Rule.

There is no easy road to advancement for the supervisor. It is long and toilsome; beset with disappointments and diverting influences; requiring fortitude and stamina to travel successfully. Only he can find and establish his own bearings—then his course of action is evident.

In seeking to attain a predetermined goal, the supervisor must take full advantage of all opportunities offered by management to keep abreast of conditions affecting his company. The successful supervisor recognizes that there is much that he must do on his own—and proceeds to do it. He must work hard and demonstrate that he has the qualifications to remain on the management team and to advance to other squads as opportunity arises.

For such a supervisor the articles in this issue are presented. Important aspects of the supervisor's activities are highlighted in articles on communication, administration, union relations, and teamwork. In none of these articles will a supervisor find all the answers. However, if he wants to become a successful supervisor, these articles will help him along the road; **but he must travel it alone.**

Are You a Good Supervisor?

Your first consideration is attitude—do you really want to advance? If so, analyze yourself to recognize your weak and strong points. Compare yourself with one of your successful supervisors. What does he have that you lack? Or try to rate yourself by frankly answering:

Am I a leader, a follower or a driver?
Am I willing to accept responsibility?
Do I place the welfare of others above my own personal considerations?
Does my judgment show common sense?
Do I show initiative?
Am I impartial?
Do I understand human nature?
Can I get along with people?
Am I willing to recognize ability in others?
Am I cooperative?
Am I a good listener?
Can I adjust myself to new working conditions and to working with new personnel?
Am I able to pass instructions along?
Do I delegate authority properly?
Can I maintain discipline?
What is my knowledge of my job?
Do I know the Union Contract?
Can I plan effectively?
Are my personal habits good?
Am I honest?
How am I, mentally and physically?

The Supervisor's Role In . . .

Bettering Industrial Relations

EDWARD J. BRILL, Director, Employee Relations
Pennsylvania Power & Light Co, Allentown, Pa.

A supervisor is one who oversees operations of a group of people. He is generally thought of as being responsible for the conduct of others:

1. In the achievement of a goal
2. In maintaining standards of productivity and quality
3. In the protection and care of men, money and materials

Generally speaking, supervisors are responsible for people, and workers are responsible for things. To carry out his task a supervisor must be able to organize work, delegate work, and follow up progress.

When supervisors are asked to define their major responsibilities, they usually state that they are responsible for those listed on page 123.

The electric utility supervisor's day is one with many problems. His planned work is continually being interrupted or side-tracked by more urgent matters. **He must be flexible. He must be able to adapt himself to many emergencies, large and small.** It is difficult for a supervisor to keep in mind all of these general responsibilities and the multitude of duties which must be performed to carry them out. To avoid this difficulty he must have an effective plan of work on a daily basis.

An analysis of supervisory practices indicates that in many cases the supervisor does plan for emergency or specific jobs in which there are a beginning and an ending time. Frequently, however, the supervisor does not plan for the time between the specific jobs. It is this time that is most important from a planning viewpoint so that necessary attention will be paid to all of his responsibilities.

Awareness of Overall Picture Essential to Good Supervision

A supervisor who concentrates too closely on the immediate objective of production will sometimes find that the very fact that he concentrates on production, hinders it. His job is so broad that he sometimes forgets to listen. **The good supervisor is always aware of communications coming up, down, and across the lines of organization. All such communications are signals.** If he is properly tuned to receive the signal, he will get information from his workers that tells him whether or not, and how well he is fulfilling each of his responsibilities.

Getting Down to Business in Supervision

1 **THINKING, ANALYZING, AND PLANNING** means working toward an objective and knowing why the objective is to be reached. It also means seeing all around a problem so all the facts that can be obtained are obtained. This primary supervisory responsibility, if applied skillfully, will help carry out most of the other supervisory responsibilities.

2 **PLANNING FOR EFFICIENT OPERATION** is also a primary objective because an electric utility must render an adequate service to the customer at the lowest possible cost consistent with a fair return on investment. In this field the enterprise is directly in the hands of each supervisor.

In his planning for efficiency, the supervisor will take into account the order in which the work is to be done, the deadlines which must be met, the man-hours available to do the work, the skills which he has at his disposal, the tools and materials needed, the amount of help needed from other departments, and conversely the amount of help he can give other departments.

3 **TRAINING** is an important part of supervision. In order to manage efficiently men, money, and materials, the supervisor will develop the worker's abilities so that he becomes more fitted for the job, more qualified, and more proficient in it.

Training will improve individual performance and when extended to the work group will produce more cooperation.

The most effective training is when the worker participates in the training. The worker should know what the job is. He should know its relationship to other jobs. The supervisor will encourage questions; get him interested. The supervisor will tell, illustrate and question the worker; he will have the worker explain the job in his own words as a follow-up check.

4 **EMPLOYEE, CUSTOMER, AND PUBLIC RELATIONS** are an important part of serving the public with utility services. It is an important matter for electric utility supervisors because we, as well as the gas, telephone, and water utilities, are literally fastened to the customers' premises by wires and pipes.

The public utility customer, however, is purchasing an intangible and in many cases does not know which individual sells that intangible. For this reason, he considers every employee he happens to talk to "The Company." It therefore becomes the urgent responsibility of the supervisor to see that workers appreciate the importance of the customer. He must see that employees are well informed on company matters so that they can talk to customers.

5 **SAFETY** is important in industrial relations. Since supervision in its broad sense means to oversee, it follows that the supervisor is in a better position to look out for a man's physical safety than any other individual of the crew. It is his responsibility to encourage and train the worker to be conscious of his own safety and that of others working with him.

Daily reference to safe methods of working will gradually encourage positive habits toward maximum accident prevention. Attendance at formal safety meetings sometimes does not lead to a knowledge of what accident prevention can mean from a personal point of view. Many electric utilities have adopted the practice of having "tailboard conferences" where workers gather around the back of a truck and discuss the job to be done. Workers have an opportunity to suggest safe methods of doing the job; they have an opportunity to suggest hazards which the supervisor may have overlooked. This is one way the supervisor can secure the participation of the workers.

Management must never fail to cooperate in matters of accident prevention. When a supervisor understands that management looks upon his accident prevention responsibility as one of the reasons for paying him, the supervisor will in turn reflect the importance of this matter to his worker.

Good supervision with respect to accident prevention will improve industrial relations.

6 **KNOWING ORGANIZATION AND DEPARTMENTAL RELATIONS** is a necessary part of supervision. As supervisors work closely with their men and also with management, it is obvious that they are representatives of management to men, and representatives of men to management. In their relationships with management they frequently find themselves in contact with departments other than their own. Almost every supervisor has some accounting problems. Almost every supervisor has some union problem which may take him to the industrial relations staff. Similarly, supervisors have problems with the engineering department, perhaps with the meter department, and over a period of time they may have contacts with every department in the company.

7 **KNOWING AND FOLLOWING POLICIES AND PRACTICES** has a most profound effect upon an industrial relations program. This is the supervisor's opportunity really to represent management. All policies are interpreted by and applied to human beings. He must know the origin of the policy, why it came into being, what it means to individuals to whom it is applied, what it will do for the whole organization if properly applied; and he must also know the human relations aspects of imparting information about this policy to his workers.

This understanding requires considerable explanation and thinking and analyzing on the part of the supervisor after he has received the information. Since no two human beings are alike in their experiences, neither are they alike in their attitudes at a particular moment. The explanation of a policy may result in an individual getting a distorted view of its application. A good supervisor will know the attitudes of his workers so that when it is necessary to explain a policy, he can explain it with due regard for the employee's attitude.

Management too is busy with all phases of the business, and sometimes in its concentration on production and costs, management may forget to stop, look, and listen for signals. Management, in planning its daily work, should look at its own responsibilities, for management is just another term for supervision. Management must work with its supervisors just as a supervisor works with his men.

The supervisor is an important part of any business organization. Regardless of his level in the organization he is responsible to men above him and men below him on the organization chart. He carries out instructions and helps to meet mutual objectives.

He is both the receiver and sender of information. From down the line he transmits it up the line; from up the line

he sends it down. It is essential that both good and bad news for his employees pass through him. It is unfair and shortsighted on the part of management to by-pass the supervisor with the news employees want to hear and then utilize the supervisor to impart news that employees dislike to hear.

Fair Play Should Be One Of the Supervisor's Principles

The best supervisor and the one who eventually receives the greatest reward is the man who is aware of his responsibility to both the company and his men with respect to policies. It is easy and not worth much money always to take the company's side of a policy; always to interpret a policy in favor of dollar efficiency. It is equally easy and not worth much money for a supervisor always to interpret a policy in favor of himself or the employee, the union, or of laxity and laziness and inefficiency. That is the easy way. It is far more difficult and worth much more money to invoke the principle of fair play.

The seven major responsibilities listed on Page 123 are essential to good industrial relations. Management can do a lot to encourage supervisors to pay more attention to them. Management can help supervisors do their job better.

Working together hour after hour and day after day is bound to raise problems. Some human beings will be late; absenteeism will occur; rules will be broken; complaints will be made.

When the supervisor pays attention to these major responsibilities—when he thinks and plans and trains—these human problems occur less frequently and when they occur, they are solved without difficulty.

One of management's most important jobs is that of developing latent abilities in supervisors. Management's job, just as the supervisor's job, is effective use of men, money, and materials. Men are deliberately placed first in this order for without *men*, money and materials are of no value.

One of the failings of management, say many supervisors, is that "they" do not give the supervisors full responsibility for the things they are expected to do. Most utility organizations have grown up through the merger of many small companies. Their business affairs are a matter of public interest. They are closely regulated by commissions. Possibly for these and other reasons management does not permit supervisors to exercise all their responsibilities. Perhaps management is afraid to let the supervisor make a mistake. However, human beings, as they go through life, learn most of their lessons through the bitter school of experience. There are no proxies in this school. The diploma is not secured in absentia. So it is with the supervisor. His abilities are developed through experience. Through practice he learns to carry out his responsibilities with a minimum of errors.

Good Management Must Give Credit Where Credit Is Due

Management interested in industrial relations will always give a supervisor credit for success just as the supervisor will give his workers credit and recognition. When management does allow the supervisor to practice his responsibilities, the supervisor must be prepared to take the blame for errors just as he is prepared to take credit for successes.

The supervisor's part in effective supervision is just as important as management's. He must open his mind to opportunities presented by management. He must grasp information and wrestle with it until he becomes its master. He must practice the skills that management expects him to use. He must not only possess knowledge and skill but must place himself in a postion where he is driven to action by that knowledge and skill.

Management can do much to stimulate and improve the natural selection and evolution of supervisors. When young employees are first placed on the payroll, many of them are on their way to becoming supervisors in later years as they acquire leadership skill. **It is true that the ability to lead groups of people comes easier to some men than to others.** It is equally true that this ability or skill can be developed and improved in all men. This is management's function:

(1) Selection of men and women to be placed on the payroll in beginning jobs.

(2) Intelligent selection of personnel for supervisory positions.

(3) Developing and training of such personnel.

Responsibilities Follow Promotion to Supervisory Job

The change from worker to supervisor is an important milestone in a man's career. One day he is busy on production with the planning and overall responsibility in the hands of his supervisor. The next day he finds himself leading a work group. Frequently this work group consists of former fellow-workers. Unless the supervisor is properly prepared for this transition, it may take him a long time to adjust his personal attitude to it. Any help that management can give him at this stage is valuable.

Training will be followed up by management in order to see that the supervisor has not only learned the principles of leadership but is learning to apply them in practice. Management will plan opportunities for supervisors to develop. The supervisor must know that application of leadership skills carries rewards both tangible and intangible. Management should see that the supervisor who exercises his leadership skills better than another supervisor is better rewarded. This is the incentive of the American enterprise system.

Electric utility management uses a variety of tools and materials for the development of effective supervision which leads to effective industrial relations. Some electric utility companies use supervisory conferences where full participation is obtained from the supervisors. Forums and lectures are used where information is given. Generally speaking, all electric utility companies from time to time use combinations of these two types of meetings coupled with the usual staff meetings and informational meetings. Special written material is furnished to supervisors for their study and information. Motion pictures and slides have proved a good tool in helping supervisors to supervise better.

An important part of all the attention given to a supervisor to help him learn effective supervision is recognition by management that in order to become better he must change. People resist change and sympathetic management will encourage the supervisor to overcome his natural resistance to change. He will be helped to reinterpret past

Tailboard Conference

experiences, and management will give him new ones which will make him a much better supervisor.

A Wide Awake Supervisor Will Train an Understudy

Perhaps management in its search for better supervision should pay more attention to training understudies. The alert supervisor who is training understudies will frequently test the worker's ability to make decisions, for decision-making is an important part of supervision. He will also encourage him to plan and study the job or work that is being performed. Thus, he encourages the worker always to look for the efficient use of men, money, and materials. Training understudies will help the supervisor to learn how and when to delegate work. This has a beneficial effect in two ways: (1) It develops the understudy, and (2) it frees the supervisor from a mass of detail.

While volumes of text have been written on the importance of delegating work, it is difficult to learn to do. A good supervisor naturally likes to turn out good work. He likes to see reports completed in detail and highly polished. He likes to have everything buttoned up. A supervisor must learn that he cannot spread himself out too thin. He must learn that sometimes movement is more desirable than perfection. Little by little he will learn the high skill of delegating duties and trusting others to help reach the objective.

Management must develop good industrial relations through supervisors. There is no other way.

The Supervisor's Role In . . .

Working With the Personnel Staff . . .

LARGE COMPANY

S. F. LEAHY, Director of Employee Relations
Detroit Edison Co, Detroit, Mich.

Many line supervisors and executives have come to accept good personnel administration as part of their day-to-day responsibility. They believe developing people and building good human relations to be a major responsibility of the line organization. Things get done through people.

Problems arise because people can't, or won't do effectively those things essential to the success of the business. Only men who know their jobs, who believe in the organization's objectives, who are motivated to do the best they know how, day in and day out, can meet the changing and complex problems facing today's management. A sound employee relations program helps build such men.

Staff personnel people have helped make the line organization aware of its responsibility for human relations. They have brought in the evidence to prove that the supervisor is the most important builder of morale. They have told him that he personally must take the responsibility for building an effective team. They have helped involve him in the development of policies which he is called upon to administer, and they have helped him develop skill in handling his human relations problems. The role of the staff personnel specialist is changing but his value to his company is increasing.

How the personnel department of a large company such as The Detroit Edison Co can most effectively help is the subject of this story. In the accompanying description of various phases of employee development, the staff representative encourages and assists the line supervisors in carrying out their responsibilities.

1 The New Supervisor

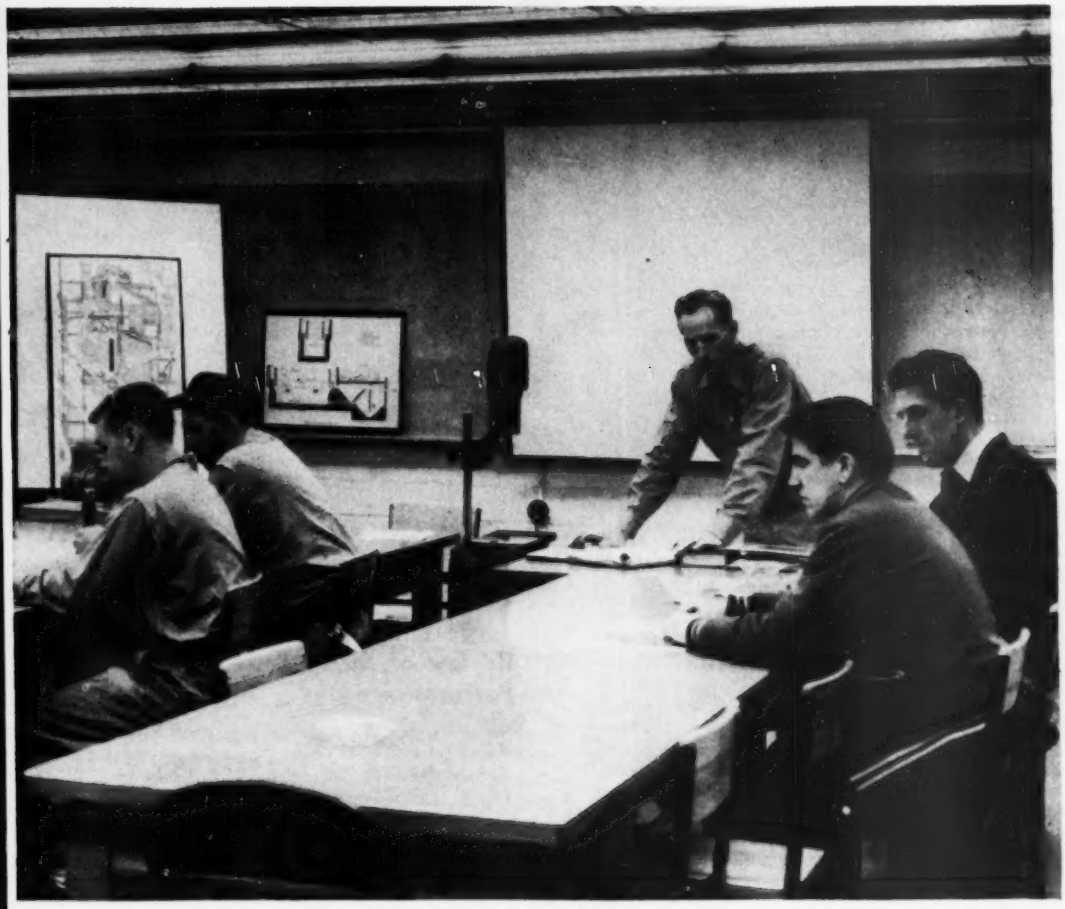
The change from skilled workman to new supervisor is a big step. New skills, new concepts, and a totally new relationship with others face him. A period off the job for basic supervisory training helps him make the transition. Here he joins new supervisors from other departments and begins to see the part his work group plays in the broader scheme of things. He discusses supervisory problems and is told about company operations. A major share of his training time is spent on the importance of human relations and his role as a leader of his group. He meets and talks with top executives. He questions the personnel staff about services available to him. Basic supervisory training was planned by experienced line supervisors with the help of staff training specialists. A training man coordinates the program but many conference leaders are from operating departments.

2 Line Instruction

Specific instruction on his duties and responsibilities begins for the new supervisor. This time his own boss does the training. Day-to-day contacts between the supervisor and his superior provide the basis for increasing skill and developing good attitudes. His superior knows that these day-to-day, face-to-face contacts build loyalty, cooperation, and enthusiasm for the job. He makes these contacts a two-way street—encouraging suggestions, listening to problems.

3 Developing An Effective Work Group

The first-line supervisor finds job training one of his major responsibilities. In the above picture the supervisor explains technical aspects of the boiler room operation.



The first-line supervisor finds job training one of his major responsibilities

Back on the job he will observe his men putting this training into practice. Keeping the training in line assures active interest, follow-up and maintenance of standards by the first-line supervisor. Training specialists helped the supervisor to learn about effective training methods—the development of training skills. Supervisors are even taught how to use visual aid equipment.

4 Improving Work Methods

Constant concern for improving work methods and reducing cost of operations is a major responsibility of the supervisor. His personal concern, example, and follow-up assure results. Training in work simplification principles and procedures by line superiors and staff training men equips him to do this job. The attitudes of employees loom large in the effectiveness with which work simplification can be carried on. Employees know their jobs, know how they can be improved, and like the satisfaction that comes with making improvements. However, they resist "experting" by outsiders, and fear changes which appear to threaten their security. Principles of good human relations help the supervisor tap the potential of his work group while avoiding resistance which can effectively block improvements.

5 Selecting New Employees

Available to the supervisor are the services of the Employment Department, whose specialists are highly competent in recruiting, testing, and screening applicants. Final selection is left to the operating department and the supervisor immediately concerned. On the personnel staff is a psychologist who develops selection tests to fit the needs of the operating departments, and who directs giving the tests to applicants. Among other tests which he has de-

veloped is one which is helpful in selection of supervisors. Employment interviewers secure and furnish information concerning the applicant's qualifications. The supervisor hires the one who he judges will best fit into his work group. The Employment Department helps in analyzing job requirements and developing selection standards for each operating job.

6 Solving Human Relations Problems

The results of an employee attitude survey provide the basis for meetings of a general foreman with his foremen. Problems of working conditions in their own division are discussed. Through meetings such as these the first-line supervisor becomes aware of the concern his boss has for good human relations. The solution of everyday operating problems comes to be identified with improving human relations. This experience helps supervisors develop the complex skills essential to handling problems of their work group. Personnel staff specialists arranged for the employee survey, developed the materials for line discussion of the results and are present at meetings to supply background information and additional facts.

7 Developing A New Policy

The effectiveness with which any policy is administered depends upon the understanding and acceptance of the line supervisor. Participation in policy formulation is the best assurance that it will meet the needs of the operating organization. Depending on the subject, discussions may be limited to top or intermediate levels. The comments and suggestions of all supervisors are used as a basis for development of many company-wide policies. Materials and information are prepared by the personnel staff for discussions led by line supervisors. Transfer and promotion principles, a disciplinary and complaint procedure, safety policy, and even benefit plans, such as health insurance, were developed in this way. Supervisors at all levels really become part of the management team when they share in these kinds of decisions.

8 Advanced Training In Human Relations

A concept of "democratic supervision" was introduced to 1,200 line supervisors starting with the company officers and going down through succeeding levels. Principles introduced by staff specialists are quickly narrowed down for application to day-by-day problems by upper level line supervisors. Meeting with personnel training men, these supervisors get information and ideas which they carry back for discussion with the supervisors who report to them. As they gain understanding of participation principles, supervisors at all levels begin bringing their people in on more and more problems of the work group. Participation results in understanding, acceptance, and a high level of motivation. Problems solved include: distribution of disagreeable jobs, office arrangement, equal allocation of work, and assignment of new equipment.

9 Eliminating Accidents

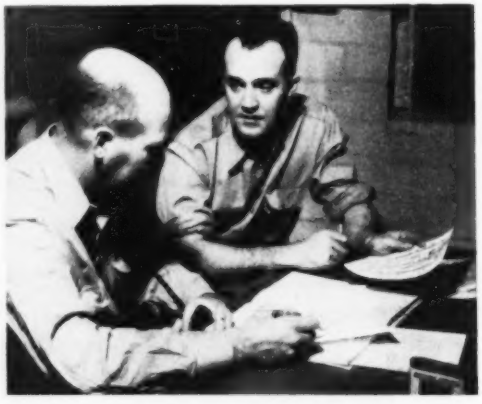
The possibility of personal injury is ever present on many jobs. The supervisor is aware that accidents don't just happen; they are caused. It is his job to eliminate the causes whatever they may be. Again, the human factor is an important consideration. Safe practices and procedures developed jointly by line supervisors and staff safety men are effective only when line supervision trains their men in safe practices—gains their cooperation in using them. Staff safety men help supervisors by discussing principles and problems with the line, analyzing accidents, suggesting safety devices and generally promoting safe working conditions.

10 Problems of Employees

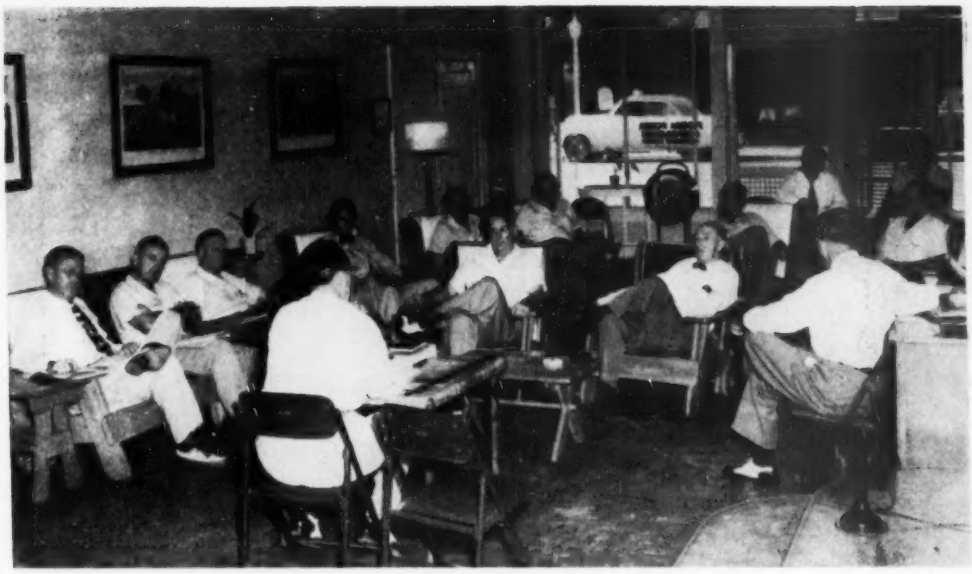
Employees have personal problems which they can't leave at home when they come to work. The supervisor is aware that good human relations include concern for the employee's outside problems as well as his job problems. He has had some training in counseling but recognizes the need for assistance with special problems. He often refers his people to the personnel staff for assistance and advice on matters such as health, personal finance, hospitalization and insurance claims, and veteran's affairs.

11 Review of Supervisor Performance

No two supervisors have the same qualifications, give the same performance, need the same development. Staff personnel men have provided top management with a plan for the line appraisal and development of the individual supervisor. Fair and impartial appraisal of the performance and qualifications of each supervisor by higher levels of supervision who are in the best position to judge is the first step. Consideration is given to performance, personal qualifications and potential. The next step is the



review of appraisals by top line executives. Following the review, each supervisor is informed of the results of his appraisal by his own boss is shown by the above picture.



Group meetings help supervisors do a better job

The Supervisor's Role In . . .

Working With the Personnel Staff . . .

AVERAGE-SIZE COMPANY

J. S. GRACY, Vice President
Florida Power Corp, St. Petersburg, Fla.

While the basic principles of human relations never change, the responsibility of the supervisor in the handling of employees has been very materially complicated during the past 20 years by the many laws and regulations which have been created. We also must consider the changing concept of employer-employee relationship.

To help the supervisors in connection with all these matters pertaining to personnel, a separate department was created by Florida Power Corp in 1937. It was the duty of this department in an average-size company to:

1. Set up uniform employment procedures and personnel relations policies
2. Maintain adequate personnel records and statistical information
3. Develop and administer employee welfare plans
4. Assist the supervisor by interviewing applicants for employment and referring to him for his consideration those having the best qualifications
5. Develop and carry out programs of employee orientation and training
6. Take the leadership in negotiations with the labor union and to administer the working agreement
7. Assist the supervisory personnel in all personnel and labor relations problems.

To accomplish these objectives, the Personnel Department has been developed and now has the following staff: director of personnel, assistant in charge of employee welfare plans, employment manager, assistant employment manager, training coordinator, safety director, three assistant safety directors, and six stenographers and clerks.

It is our opinion that **the supervisor wants "to be on the team."** But all too often he is never consulted by top management in the establishment of company policy or informed of what has taken place or is planned for the future. **The way "to get him on the team" is "to put him on the team."**

Management Meetings Help Get the Supervisor on the Team

One of the important ways the Personnel Department attempted to accomplish this was by having quarterly management meetings. These were all-day affairs held in the various operating divisions and attended by all supervisory employees in the area. Executives and the heads of the major departments appeared on the program. Ample time for discussion and questions was

Supervisors talk man-to-man with Pres W. J. Clapp, second from right

provided for we believe in the two-way system of communication.

In these meetings the supervisor quickly developed a sense of belonging, a feeling that he was really a part of management. He could get first-hand information on what was happening in the company or planned for the future. He didn't have to rely on his employees or union stewards to tell him the score.

Union Agreement and Grievances Are a Supervisor's Problem

One of the most difficult jobs of the supervisor is the administration of the union agreement and the handling of grievances. It is the job of the Personnel Department to keep the supervisors fully informed as to the interpretation of this agreement. Before each annual negotiation the supervisors of those departments included in the bargaining unit are asked to submit any suggestions that they may have as to changes in the working agreement.

When the union proposal is received, a copy is sent to each supervisor with the request that he give his opinion as to how each proposal, if granted, would affect the operation of his department, plant, or crew. During negotiations the supervisors are kept informed as to progress and, when negotiations are concluded, are notified immediately. If changes are made in working conditions, meetings of supervisors are held to inform them fully of the basis on which the company agreed to the changes and the proper interpretation of the new or changed provisions.

Although a company-wide coordinator is necessary, the administration of the union agreement, as well as all company personnel policies, is the responsibility of the immediate supervisor. In this activity the Personnel Department is available to the supervisor for consultation and advice. But, if the supervisor is to hold the respect of his employees, it is imperative that when an answer is given to the employee the supervisor is the one who gives it. If he gives the wrong answer and a grievance results, every effort should be made to let him correct his own error.

In the field of job training the Personnel Department can be of great assistance to the supervisor. Until a few years ago job training was left entirely to each supervisor with no coordination or formalized program.

However, with our rapid growth, the complication of the supervisor's job as mentioned, and the changing techniques and methods, it was necessary for the supervisor to have assistance in this field. Accordingly, a man trained in the educational field was employed as training coordinator. It is his job to work with the supervisors in all phases of employee training. This is proving to be a very worthwhile activity.

Title and Pay Raise Not Enough to Make a Man a Supervisor

Several years ago we realized that we were doing nothing to assist the newly appointed supervisor in bridging the gap between being a "rank and file" employee and a supervisor. By the simple process of giving him a title and a raise in pay, the man was supposed to have acquired all of the required knowledge, techniques, and skills satisfactorily to represent management in the supervision of employees. Going on the assumption that no supervisor can know too much about the company and the many important factors that enable him to do a good job, training courses were established for the various groups of first-line supervisors such as local manager, line foreman and assistant plant superintendents.

Within three months after the employee is promoted, he

comes to the general office for a two to three day period of training and discussion with the various general office department heads. This not only provides him with information in regard to the operation of the various departments but gives him an opportunity to ask any questions he may have as well as seek assistance with any problems which he has encountered in his new position.

New Supervisor Gets Acquainted With Company Policies

The visits with the department heads are scheduled by the Personnel Department. It is only logical that his first visit would be with the director of personnel who explains thoroughly the reason for the program and outlines the other appointments that the new supervisor will have. In addition he talks with the supervisor about his new responsibilities in the personnel field, covering such matters as human relations, company policies, and handling of grievances.

Depending on the work of the particular supervisor, he is then routed to various departments such as general accounting, billing, payroll, and fixed capital. Here he learns their functions and where their operations fit into his particular responsibilities.

In his visit with the claims adjuster the supervisor learns the main features of the state Workman's Compensation laws, with full explanation of how to fill out the various forms required in connection with accidents.

The supervisor then visits the employment manager who explains the personnel manual so that the man in the field will have a thorough understanding of personnel policies and employment procedure. This includes hiring of new employees, transfers, lay-offs, discharges, and resignations. He also learns how to handle merit and periodic increases and the various forms that are required.

New line foreman (center) learns about paperwork

Every supervisor has a definite responsibility for the success of the safety program. As a rank-and-file employee, the new supervisor had been thoroughly trained in safe methods and practices. But now he is going to be responsible for the safety of employees and needs assistance from the safety director on how to be most effective in this field.

The director of purchasing and stores explains the procedure for issuing emergency purchase orders for small purchases as well as how purchase requistions should be completed and handled.

The new supervisor then goes to the operating department. He gets up-to-date information on any plans under consideration which might affect the supply or distribution of electric energy in his particular area.

The system dispatching office is in the same city with the general office. Here the supervisor learns how the dispatchers handle their work.

In case the supervisor is the manager of one of the field offices, he also visits the head of the Commercial Department, getting first-hand information on all of its load building activities. He also visits the vice president in charge of franchises, rates, and taxes to get a more thorough knowledge of rates that apply in his area.

The procedure in obtaining new franchises is explained to him, and he is informed as to the franchises in the towns which will come under his jurisdiction and the taxes the company pays in his area.

The company's Advertising Department not only has the responsibility for handling advertising and publicity but also for producing "Power Lines," our employee magazine. While no employee is directly responsible for public relations, our advertising manager acts as coordinator.

He discusses the public relations problems which the supervisor will face. A definite relationship is established so that there can be quick communication between the man in the field and the Advertising Department.

It is always a pleasure for the writer to explain to the supervisor that he is now a very real part of management and has an important role in the company's success. We have always liked to think of our human relations as simply being "men dealing fairly with men." In this way we explain to the new member of our management team that while all the various activities of which he will now have charge are important, none will be as important as those dealing with people.

His next call is made on the president, a man up from the ranks with 27 years' service. He has served in many capacities and thus is able to understand the supervisor's present and future problems.

The last call the supervisor makes is on the general supervisor directly in charge of the work which he is performing. For example, the new local manager or line foreman will visit with the vice president in charge of division operations while the new assistant plant superintendent will spend some time with the general superintendent and superintendent of production. Here the whole activity of the past few days is discussed with him to make sure that there is a clear understanding on the new supervisor's part before he leaves. At this time there is also a discussion of the civic responsibility of all employees and especially the new supervisor.

About 90 days after the original training period, the supervisor returns to the general office. This time he comes to discuss with the various department heads any problems encountered in connection with the work coming under the supervision of that particular department.

The Personnel Department members must continually keep in mind that they are staff assistants to all supervisory personnel and that they must constantly strive to make this assistance more and more helpful to the supervisors in carrying out their responsibilities.

The Supervisor's Role In . . .

Reaching the Employees

R. G. KENYON, Vice President
Southern California Edison Co, Los Angeles, Calif.

Communications from people in whom we have faith and to whom we look with respect have an opportunity to be effective. Those which we receive from people in whom we have little or no faith and for whom we have little or no respect cannot under normal conditions be expected to be effective. In attempting to solve the problem of how to establish effective lines of communication within a company, it is important that we understand these simple truths.

There are a number of ways in which a start toward building faith can be made, and many such starts have actually been made. **One of the simplest ways in which to get people to believe other people is to put them down at a table where they can face each other and talk things out.** Some of the problems which must be considered before attempting to establish a formal communications program are:

1. The attitude or viewpoint of the non-supervisory employee toward all grades of supervision.
2. The attitude of the lower levels toward the upper levels of supervision.

The first group with whom close and cordial communications must be sought is supervision. Many surveys have indicated that a high percentage of lower levels of supervision is not by any means convinced that they are really part of the management structure of the company. It has been our experience that a mere affirmation to this effect has little or no weight. The supervisor must be so approached that he will, by his own process of reasoning, arrive at the conclusion that he is truly a representative of management.

When the question as to the establishment of an employer-employee communications system is raised, people are inclined to over-emphasize the importance of information or facts to the program. Facts, of course, are an important phase of any communications system, but a communications system to be worth anything to any business

4 Questions to Which Management

1 WHY

Should We Tell Them?

People universally have an urge to be recognized as important and essential. Any formalized method of communication directed at employees should be construed as a technique aimed toward making each individual supervisor and employee feel more important and essential. This is a fundamental truth and must be recognized as such. While laying emphasis on building attitudes, it must not overlook the fact that interchange of ideas is very essential. The only practical method of controlling the "rumor factor" is to have the real facts furnished authoritatively.

2 WHAT

Should We Tell Them?

If we make the opportunity to confer with our people, we should certainly see to it that the end product of the program be useful and worthwhile. Anything which will further the employee's feeling of belonging to the institution with which he is employed is definitely indicated. Company history certainly should have an important place in the program. No single one of the arts has a greater potential as a loyalty builder than history, whether it be history of the country, history of the family, or history of the company. If it is a history of the institution to which one belongs, knowledge of it tends to stimulate pride and loyalty. Again it should be stressed that the information which they are acquiring is only incidental to the possible attitude which can be developed by proper approach to pride, loyalty, and other helpful human traits.

3 WHEN

Should We Tell Them?

It can be answered in one word—continuously. The old-time supervisor who never spoke to an employee other than to "bawl him out" has no place in this modern industrial scheme. An employee must feel that his boss will not only check him for errors but that he will also counsel and guide him in the actual carrying on of his duties. This relationship must be a normal and regular one. It cannot blow hot and then cold. The fact that a supervisor signed a man's application that put him on the payroll five years

should have as its most important fact the creation of good and healthy attitudes.

Our school systems attempt to teach our children facts. During the first fifteen to twenty years of an individual's existence, the school system is, consciously or unconsciously, doing more than putting forth facts. It is helping the students to frame attitudes. The students are being graded on the facts which they retain at the end of each term or year. But social and industrial life is being much more seriously affected by the attitudes which are being built into the minds of the same students. The students are not graded on these attitudes but they are definitely of far greater significance to the individual and to the world than are facts which he takes home with him.

Progress Is Not Automatic Although Many Think It Is

For example, there is this matter of the "inevitability of progress." The ordinary school student today acquires his attitudes without a full knowledge of the fact that he is acquiring same. He comes into the business world with pre-conceived notions of which he himself is not fully conscious. One of these acquired concepts is the belief in the "inevitability of progress."

Twelve to sixteen years of formal educational procedure in which all but the lowest one to five percent are promoted year after year, practically on an automatic basis, is very apt to create the impression that progress is automatic. In checking with many men who have left college in the past ten years, I find that inherent in their attitudes, although not a part of their conscious thinking, is the concept that there is such a thing as "inevitable progression" which they found to be so convenient in the school system. When they discover that there is nothing inevitable about an individual's progress in the business world, some are inclined to be critical of the "system."

This "inevitability of progress" fallacy is cited only as an example of the unconscious accumulation of ideas and of attitudes which all of us pick up as we go through life, and it is cited primarily to raise the question as to whether or not any communications program we establish for our people should be aimed at informing and making them aware of more facts or whether it should be aimed primarily at developing a healthy attitude toward life and business.

We have stressed, and are continuing to stress, meetings. We find that meetings make all the other communications procedures more effective. At the present time we have under way a series of supervisors' conferences. One of the primary objectives of these conferences is to develop the ability in the supervisor to reach the employees. Here's how it is done at Southern California Edison Co.

Every week eleven supervisors picked from various parts of the company are brought into the general office for a full week's schedule of meetings. All levels of supervision, up to major department heads, are included in these meetings. As far as possible, we do not duplicate classifications in any one week's group. It is surprising how few of the participants know more than three or four other men in their conference group when sessions begin. An important aim is to have each man gain an appreciation of his personal need of the work which other supervisors are carrying on. These meetings are intended to make a man conscious of his place in the supervisory structure of the company. They cover fundamentally all of the company's operations but stress the employer-employee relations factors of these operations. As of today there have been 57 of these groups brought into the general office for this week-long conference.

Conferences Help Supervisors Make Their Jobs Easier

It is important that the supervisors participating in this week-long conference realize that this is an honest effort to help them improve their own abilities to use their own talents so that the supervisory job with which they are charged may be more effectively and more easily performed. It must be carefully explained that no one can give specific instructions on performing supervisory functions.

Supervision is a highly individual procedure. What will work in the case of Supervisor A would be completely taboo for Supervisor B. The supervisory conference should make it possible for the individual participant to understand his place in the total company picture and to assist him in developing as an individual the feeling of actually being a member of the supervisory team. It is astonishing the doubt which apparently exists in the minds of

Should Seek Answers

ago is not sufficient from the man's point of view to warrant in him the feeling that "My superior likes me and likes my work." It is essential that a supervisor continuously seek opportunities to encourage and build the confidence of his workers. An employee wants to be reassured and if we want an employee to do his best work for us, we must afford him this reassurance. Incidentally, it is important that the reassurance be truthful and straightforward and that we avoid at all costs false praise for work which is not praiseworthy. It is important to remember that people are motivated to a high degree by their emotions and not by logic and reason.

4 HOW

Should We Tell Them?

This can also be answered in a simple manner. We should use every vehicle of personal communication that is available to us. The company house organ is one; the bulletin board is another. Direct correspondence between the top of the company and the employee is a third. Frequent meetings, well planned and executed, constitute a most effective tool of any communication plan. There are many other procedures possible, almost any of which can be helpful.

Five Day Conference Schedule For Supervisors

Day	Time	Subject	Conference Leader
MON.	9:00 a.m.	Orientation	Ind. Rel. Dept.
	9:15 a.m.	Introduction and the Supervisor's Role	Ind. Rel. V.P.
	10:30 a.m.	Company History & Development	Ind. Rel. Dept.
	1:00 p.m.	Organization & Administration of the Company	Ind. Rel. Dept.
	2:30 p.m.	Qualification Tests	Ind. Rel. Dept.
TUES.	9:00 a.m.	Our Place In the Economic System Film—"Productivity—Key To Plenty"	
	10:30 a.m.	Govt. In the Economic System	Outside Economist
	1:00 p.m.	The Company as a Privately Owned Utility	Ind. Rel. Dept.
	2:15 p.m.	Company Financial Trends	Financial V.P.
WED.	9:00 a.m.	Customer Relations	Commercial V.P.
	10:30 a.m.	System Operation	Operating Engineer
	1:30 p.m.	System Dispatching	
	2:45 p.m.	Tour Communication Building	
THURS.	9:00 a.m.	Labor Relations (Grievances)	Ind. Rel. Dept.
	1:00 p.m.	Employee Qualification Reports	Ind. Rel. Dept.
	2:30 p.m.	Our Company	President
FRI.	9:00 a.m.	Operating Department	Oper. Dept. V.P.
	9:30 a.m.	Job Evaluation	Ind. Rel. Dept.
	1:00 p.m.	General Discussion & Questions	Exec. Vice Pres.
	2:00 p.m.	Critique	Ind. Rel. V.P.
	2:20 p.m.	Commercial Plans	Commercial V.P.
	2:50 p.m.	Operating Plans	Operating V.P.

supervisors as to just where they stand in the company structure.

While the schedule for the week's conference places considerable emphasis on the various and sundry techniques of industrial relations, such as job evaluations, grievance procedure, employee testing procedure, and the like, it will be apparent that the content of the overall schedule is intended to cover the work of the entire company. It is hoped that each man present will have a renewed pride in the work and in the men who direct the work of his particular department.

One of the very important by-products is the opportunity afforded each of these eleven men to discuss with their fellow conferees their common questions and problems. Team consciousness, we are certain, is being developed by this interchange.

As this program has developed over the past year, more and more emphasis is being placed upon the need for these conferees to carry back to their local areas the impressions which they have gained at these sessions. Conversations with former members of the conference indicate that definite progress is being made. Reports drifting in indicate that a stronger and more helpful company feeling is being engendered.

Weekly Sessions Planned to Orient New Supervisors

The first meeting on each Monday morning is devoted to an orientation procedure and an introduction to the whole week's program. A real effort is made to make the conferees feel at ease. Our supervisor of training actually handles the mechanics of the conference and leads some of the discussions. A heavy dose of company history and development and organization and administration of the company is given the first day. On Tuesday afternoon a presentation on the subject, "The Company as a Privately Owned Utility," ties in closely to the presentation of more company history and the story of company organization and administration.

Early in the week a session is held in which the company's organization chart is gone over carefully. At the end of this meeting a copy of the chart is given to each man. There exists an apparent lack of definite information as to who works for whom and who does what on the part of the conferees.

Employee qualification tests are discussed at some length during the week. The qualification test procedure is relatively new and was developed to help supervisors in making a decision with reference to an employee's growth in capacity and performance.

Supervisor Gets First Hand Information on Economics

An outside economist has the last half of the Tuesday morning schedule. This man has been attached as **an Economics Professor to two of the nation's leading universities and brings to the conference high level and sound economic thinking.** The session is devoted to a fundamental review of foundation economics. Every effort is made to tie in these fundamental economic facts with the local economic problems of the individual conferee.

The Vice President in charge of financial matters has an important session with the group. He uses a prepared talk covering our company's financial problems. Why do we borrow money, how do we borrow money, why do we issue bonds, why do we issue stock, and similar subjects are among the topics covered by this talk.

In recent weeks he has found that the question period affords a better opportunity to reach the group on the subjects in which they evidence the greatest interest and he is, therefore, devoting more time to the questions and to general discussion. One of the subjects which he covers in the course of his session is the company's annual report, its purpose and its meaning.

The Commercial Department has an opportunity to talk over with the conferees the problems which are peculiar to the commercial functions. The question of actual consumer relations receives a thorough-going coverage. Problems of coordination between commercial and other departments of the company are included in the discussions.

Supervisor poses question to Pres W. C. Mullendore

One of the very interesting highlights of the week is the story of the system operation of the company, which is about half hydro and half steam generation. This proved to be one of the most interesting sessions of the week.

A full period is devoted to the story of system dispatching. This, too, has proved to be a very worthwhile experience for the groups.

One whole morning is given over to the general subject "Labor Relations." Current labor problems and current negotiations are discussed and the relation of the Industrial Relations Department to other phases of company operation are gone into rather fully. Using the role-playing technique, the grievance procedure is thoroughly analyzed and explained.

Another aid to supervision, Employee Qualification Reports, occupies one full session during the week. This is a session that apparently is very well received by the supervisors as they appear to welcome help in this particular part of their duties.

The job evaluation program is another that arouses much interest on the part of the supervisors and is well received. The need for job-evaluation work, its values and its limitations are given a thorough exploration.

As the week moves on, various officials of the company, including the President and Executive Vice President, take turns in acting as conference leaders. Each of these men gives an hour or an hour and a half to this group each week. We feel that the presence of the executives of the company as conference leaders makes these conferences most effective. The reaction of the conference groups to the fact that they have had an opportunity to talk freely and informally with men with whom they normally would have little or no contact, has been extremely favorable.

Evidence piles up week after week that information alone should not be the objective of a communications program. The last thing on Friday afternoon we talk over with the conference group the week's work and check with them as to their reaction to the overall program and when a man will say, as one did recently, **"Where else will you find a company in which the President himself will just come down here and sit and talk with a bunch of fellows like us?"** we feel that we are approaching our objective. We feel that this type of reaction indicates that healthy and loyal attitudes can be stimulated.

If with these supervisory conferences and the other more orthodox techniques which we are using to reach and talk to all our employees we are able to create faith in management on the part of our people, we will then be ready to approach our employees with a broad facts-carrying program.

If the present programs are doing the job which they are expected to do, we know that we will then be talking to a receptive audience. If this condition prevails, the final result can only be better management from the highest to the lowest level.

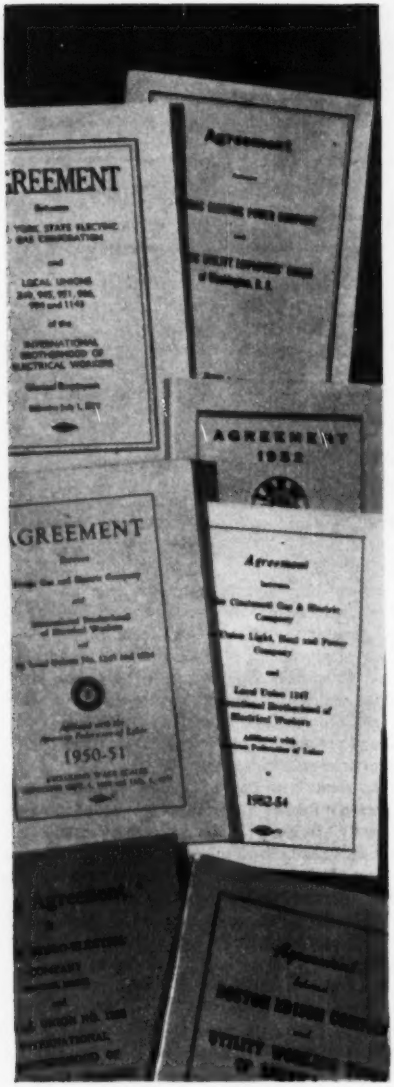
The Supervisor's Role In . . .

Making the Labor Agreement Work

CLIFFORD B. BOULET, Director of Personnel
Wisconsin Public Service Corp, Green Bay, Wisc.

Many a man has lost his shirt, or his house, or his fortune because he failed to read the fine print in a contract before signing it. His failure to know and understand all the terms of the contract has never in the eyes of the court excused him from carrying it out.

What is true of real estate transactions, contracts to perform services, or to build bridges is likewise true of contracts between employers and organizations representing their employees. Too often these contracts are referred to as "agreements." They are looked upon only as the closing chapter in labor negotiations rather than the opening chapter in the development and administration of satis-



factory human relations over a long period of time.

The problem of proper understanding and administration of a labor contract is one whose solution cannot be placed on the shoulders of top management alone. Neither can this problem and its resulting costs be placed on those who at the bargaining table formulated the terms of the agreement. **The problem involves top management, the Personnel Department, all operating supervisors, the company's communication program, the officers and leaders of the union and, of course, the whole body of employees.**

While the labor agreement is between the top management of both company and union, it establishes the conditions under which work will be performed and defines the rights, privileges, and obligations of both management and men. It is a fact that the document commits all supervisors to perform certain acts and to refrain from committing others. Failure in either respect can result in a chain reaction culminating in work stoppages, slowdowns, grievances, unfair labor practice charges, and substantial financial losses to the company.

Yet in the great majority of cases these same supervisors who must carry out the agreement have had no part in its making. Thus in many cases they do not know its exact terms or the interpretation and practical application of its terms.

Good Labor Relations Hampered by Misunderstanding of Contract

One of the resultant evils of the failure of management's representatives to know the contract is the development of voluminous legalistic types of agreements. In these, attempts are made to spell out virtually every detail of the labor-management relationship. Each violation of the agreement because of either lack of knowledge or refusal to carry out the terms creates a new situation under which new demands for new restrictive clauses must be reconciled before another agreement can be signed.

The whole situation develops into a vicious circle feeding on itself until supervisors become so confused that they become timid in their day-to-day relationships with their men. They are constantly fearful that some act or decision may bring new reprisals, new restrictions, and criticism from management. At the same time the agreement under which they must operate becomes more and more complex and involved. Finally it reaches a point where it is next to impossible to secure mutual agreement as to the meaning of the labor contract.

If this undesirable situation is to be corrected, it is necessary to give careful consideration to these points:

1. Ways and means must be developed to bring supervisors into the making of the contract.
2. The supervisor must have a full understanding of each clause in the contract together with the reasons lying behind the inclusion of each provision.
3. He must have detailed information relating to its interpretation and day-to-day application under work conditions.

While it is recognized that there are other difficulties, for instance understanding on the part of employees of the labor agreement, this discussion will deal primarily with practical methods of achieving the three above points.

Viewpoint of Supervisor Aid to Negotiating Labor Contract

It would seem practical and feasible for company representatives who are to negotiate a labor agreement to get in touch with each supervisor several weeks before negotiations begin. They could then get his opinion as to what changes should be made. Such an approach will immediately bring the supervisor as part of management into the policy making group and simultaneously apprise him of the fact that he is a party to the contract.

There is no question but that virtually every supervisor has the ability to put the provisions of any contract into

effect if he so desires. On the other hand if he is antagonistic because in his opinion the contract is being forced on him, it is quite positive that he will not make a sincere effort to apply it even though he understands it. For these reasons it is important to bring every supervisor into the contract picture at the time the agreement is being conceived.

Conferences should be held between one of the company men who is to sit at the bargaining table and each supervisor who must subsequently work under the contract. These present an opportunity to discuss the various terms and to bring to light difficulties that have been encountered in effectuating the terms of the prior contract.

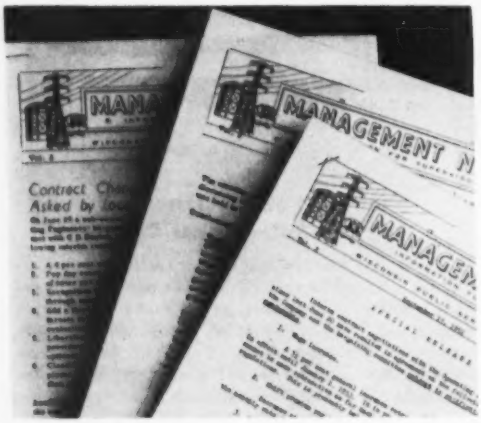
Regardless of how supervisors' opinions are screened, it is wise to screen all suggestions made prior to going to the bargaining table. It will be found that **many of the suggestions and criticisms are due not to the failure of the labor agreement but rather to lack of understanding or misinterpretation of it.**

Negotiator Helped by Awareness of Supervisor's Suggestions

Even though all suggestions made by the supervisory group cannot be utilized in negotiations, the negotiator is in a better position because he more thoroughly understands the supervisory viewpoint. This is vital because acceptance by those who administer the contract is dependant on either the meeting of their viewpoints or the changing of their attitudes. So much for the first step.

It is customary when the contract is to be reopened for the labor organization to submit to management a list of conditions or demands to be added to or deleted from the agreement. Here again, **keeping in mind the need of supervisory acceptance and cooperation, good sense dictates the desirability of informing all members of the management team, which includes all supervisors at all levels, of these demands as soon as received.**

It is likewise desirable as part of the training procedure to invite expressions from the individuals to whom this information is given as to the desirability or necessity of the change, or perchance a compromise that might be more desirable, together with the effect such change would have on their operation if it should become part of the labor agreement. All of this information in itself is invaluable to the company representatives negotiating the contract. More important, however, is the by-product of gaining interest, understanding, and acceptance on the part of the supervisory group.



News bulletins on labor negotiations are sent daily to supervisors

Report Negotiations Unless Publicity Delay Is Necessary

As negotiations proceed, unless there is good reason for secrecy or an agreement between union and management that no publicity be given as to the progress of negotiations, continuing reports through letters, bulletins, or group meetings of supervisors, should be promptly released. Again comments from the supervisory group should be invited. This completes the second step.

With the signing of a new agreement, the third step must be taken. Machinery should be put into motion without delay to inform all representatives of management of its terms. In order to accomplish this objective a number of techniques may be utilized.

So that there be the least possible delay, it is suggested that within 24 hours after reaching an agreement a notice be mailed to everyone in management involved in the carrying out of its terms. This notice should stress the changes which have been made in each section of the contract and their significance. It is desirable in order to prevent misunderstandings to illustrate by example just what is intended under each change. Some companies use the question and answer approach. They set up a list of typical questions that might be raised by employees and give the correct answers.

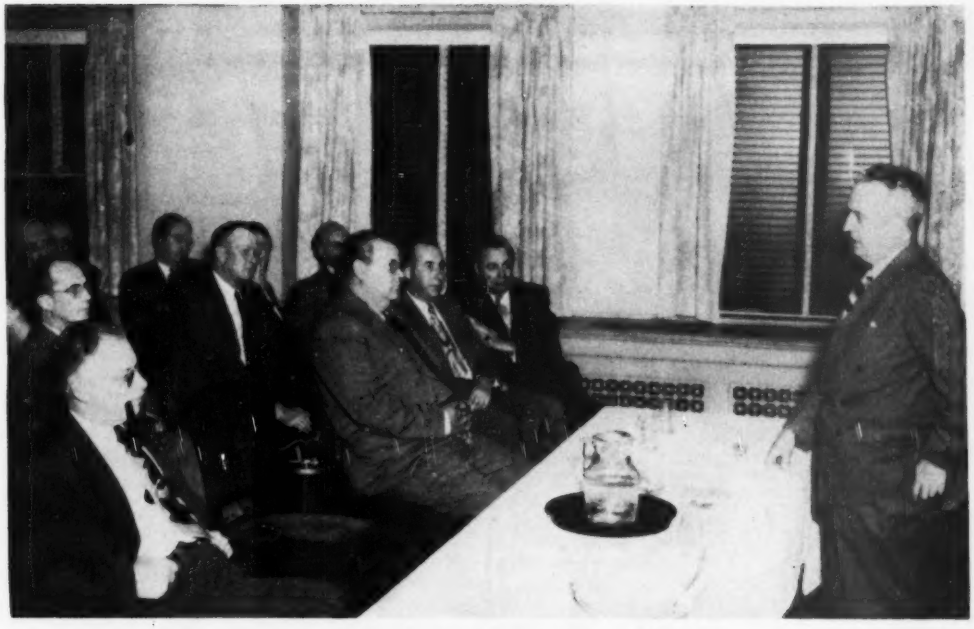
After the contract is printed it should preferably be indexed for ready reference and a copy sent to all supervisors immediately. In the printing every effort should be made to make it readable by using plenty of white space and legible type. It is not a bad idea to bring into the picture at this time the advertising department or some individual who has had experience in printing to be certain that everything possible has been done to make the contract readable.

Realizing that a **simple reading of the contract may not give the supervisor the information he seeks on some special phase of his operation, many companies have prepared as a supplement a supervisor's handbook** based on contract interpretations as well as company policies which may not be contained in the contract.

Supervisors Should Get Indexed Handbook Covering Contract

This handbook is occasionally indexed with such items as absences, necessary time off, vacations, sick leave, suspensions, dismissals, reinstatement, etc. The handbook likewise gives illustrations of various situations and proves a valuable and ready reference for the supervisor in his day-to-day operations. It likewise guarantees that the contract will be administered in a uniform manner by the departments.

Since there are times when situations will develop where no correct answer can be found either in the contract or



Personnel director briefs supervisors on changes and interpretations of new contract

in the handbook, there must be established a quick avenue through which any supervisor can secure an immediate answer to any problems relating to handling of men that might arise. In virtually all operations the Personnel Department is perhaps in the best position to act as an interpreter and to answer questions. It is imperative, therefore, that a close relationship be developed between supervision and personnel, placing the answer to questions just as close as the nearest telephone.

Management and the Supervisor Study the Signed Contract

The time has now arrived when **a careful study of the contract should be made at conferences with supervisory groups.** These meetings should be called and led by someone who took part in the negotiations and who thoroughly understands all contract provisions, their implications, their reasons, and how they are to be administered. Discussions should be as informal as possible with all members of the group free to ask questions which will clarify specific situations that might arise.

If preceded by the preliminary steps discussed, these meetings will develop an intensive and sincere effort on the part of the supervisors to be thoroughly informed so that they can conscientiously and fairly administer the contract to which they have become a party. Under these circumstances each member of the group gains confidence through his knowledge and is able to meet most situations without hesitation or misgiving.

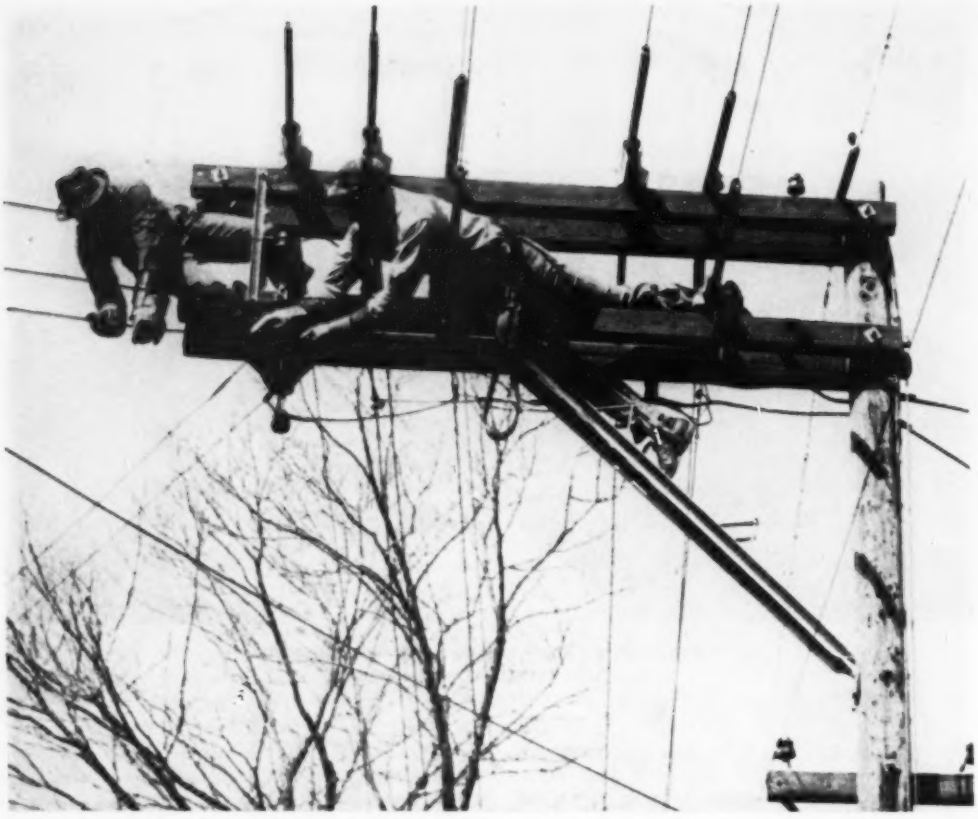
Finally in an effort to assist the supervisory group in the proper administration of the contract, some companies arrange meetings of employee groups in each department. At Wisconsin Public Service Corp those present are the supervisor, a representative of the union bargaining committee, and a company representative who took part in the negotiations.

At these meetings changes in the contract are explained to the worker group by the company representative, and questions from the group are answered by either the union representative, the supervisor, or the company representative.

It is virtually impossible for misunderstanding to arise as to the meaning of any part of the labor agreement if such meetings are held. Such conferences establish confidence on the part of labor in the integrity of management. Likewise they give management's representatives the feeling that because of this thorough understanding no advantage will be taken by workers.

As a further effort to develop mutual understanding between management and labor, it is suggested that contract changes be explained in the company magazine, through bulletin boards, or if the change is an important one, by direct communication such as a letter by the president of the company to each employee.

And finally, study of the labor agreement to discover areas in which such plans can be utilized is a necessity. It is important to remember that the vital effect of a labor contract rests on what happens in its execution. The fairest, most liberal, and unbiased agreement can be made a mockery if only lip service is given to its provisions and if supervisors ignore or transgress its terms.



The Supervisor's Role In . . .

Getting Teamwork

F. L. LARKIN, Vice President, Wisconsin Electric Power Co

Teamwork is not born and cannot be mandated. It must be earned by the supervisors. The only way to get it is for supervisors to be "leaders" not "drivers." This will enable them to inspire teamwork, that intangible result of effort freely given by members of a group to obtain the best possible results for the majority involved. How can this be accomplished? Here is an answer:

The basic bedrock of teamwork is the factors contributing to it. They are all in the HUMAN category. They are not for sale. You cannot buy them. The will to work is psychological and not economic.

Of course some wage incentive systems, such as that of Wisconsin Electric Power Co which pays extra wages in proportion to performance, apparently help to achieve teamwork in some group operations. But, after 25 years, we still believe that stimulation comes not so much from the extra dollars as from the feeling of employees that they are in business for themselves and in competition with similar groups within the organization.

No one can write a formula, which will result in a high degree of teamwork in a specific industrial situation. The formula will be different for almost every situation because the people involved—and supervisors are people—the type of work, physical surroundings, and a dozen other factors all exert their influences.

However, there are a number of factors which study and observation indicate have a definite effect on that part of morale which includes teamwork.

If we can assume that:

1. The supervisory staff in a given situation is competent and well trained,

2. The employees have been carefully selected for the work and have been adequately trained,

3. Job evaluation or a similar device has established wage rates in proper relation to each other,

(*Continued on page* 142)

Seven Teamwork Factors

1 Type of Work

The most favorable situation is found in groups of highly skilled craftsmen. They perform work where craftsmanship is still recognized. In simple and routine or specialized work variety can be injected by moving employees around, making them proficient in several jobs, changing their duties and responsibilities. The "methods" boys will probably tear their hair at such a thought but we are talking about teamwork. If that is the objective, the supervisor who attempts to add duties to jobs and who attempts to spread the delegation of responsibility is more nearly right than the Methods Engineer who wants to tear jobs down into monotonous little pieces.

2 Size of Group

Teamwork is more apt to be present in small groups, partly because each group member does a wide variety of work. For example, you are apt to find more teamwork in a small outlying division than in a large metropolitan division doing the same type of work. In the outlying setup a line crew will do new construction, all types of maintenance, trim trees, do a little substation work, string service drops, and maybe even collect a delinquent bill now and then. In the "Big Town" you find construction crews, maintenance crews, service crews, forestry crews, and other specialized groups.

3 Security

Supervisors, in teamwork groups, themselves have a definite feeling of security and adequacy. They do not have to spend time and energy wondering what their superiors are thinking about them. They know. Their native abilities and knowledge of their jobs are such that they feel on top of the situation—they feel adequate. They know the limits of their responsibility. They have considerable latitude for individual judgment. They are part of a flexible organization and are not themselves subjected to constant, close supervision.

4 Suggestions

Practically without exception, supervisors in teamwork groups are receptive to suggestions from subordinates. In fact they invite suggestions because they know, beyond all other factors, the importance of having each subordinate participate in the team's accomplishments. Foremen have practically abandoned the old idea of status—the "I'm in control" idea. They know precisely how a given job should be done, but you are apt to hear them in a tail gate huddle saying, "This is my idea of tackling this job—whatdayah think?"

One strange phenomena of industry is that "Top Management" almost invariably use this "participation" technique in their dealings with their immediate assistants and associates. Apparently they believe that it produces the desired teamwork only among VIP's which is not true. It will work at all levels in industry and every subordinate gets a deep sense of satisfaction from having his superior seek his counsel and participation in any project. Even if it isn't anything more than "What color shall we paint the walls?" Such participation not only tickles a man's ego but gives him an added sense of security—he belongs.

5 Performance

Supervisors in teamwork groups expect capacity performance but ndt equal performance. They recognize that each employee is an individual. And that each individual is different. They do not try to make all employees alike. Performance is 100% when each employee is up to 100% of his individual capacity.

6 Motivation

Supervisors in teamwork groups are "employee centered" rather than "production centered." If asked about their jobs they are apt to reply, "My job is to work with human beings" rather than, "My job is to get out the work." The teamwork supervisor gets out more work than his production centered colleague but not by setting quotas and pressing, pressing, pressing to meet the quotas. He knows that external pressure for production through constant, close supervision, constant instructions, constant prodding are effective to a degree and temporarily but, because the will to produce is psychological, he has found that the only lasting, dependable stimulation for production comes from within the employees.

7 How'm I Doin'

Workers in teamwork groups have a feeling of security to a high degree in that they individually know where they stand—how they are doing. They know "The Boss" approves of them. Part of the workers' feeling of security lies in the fact that they know what to expect from the supervisor. If they have done a good job and their conduct has been proper on their assignments, they know the supervisor will back them up to the last ditch.

If they have not done a good job or if their conduct has been improper, they know that the supervisor will not cover up for them. The supervisor will never pass the buck to cover his own errors and will not tolerate buckpassing by others. He is fair, which means that he cannot despite personal inclination always be a "good fellow."

4. The work surroundings are reasonably good, then some of the teamwork factors can be enumerated for what they are worth.

If we have a situation in which these basic assumptions are not a reality, any attempt to build a structure of teamwork will be as frustrating as beginning the construction of a house by nailing on the clapboards before the frame is up. It can't be done.

Although somewhat stereotyped, a few factors are discussed on Page 141. They contribute to teamwork. They serve to re-emphasize that the type of morale we are seeking is not the product of an industrial organization but rather of an informal, social organization within an industrial situation.

Actually, the atmosphere conducive to teamwork and improved performance would be technically in violation of a supervisor's status in those situations where his duties and responsibilities are circumscribed by strict rules, iron-clad policies, and close surveillance from a rigid superstructure of management. If such is the case, forget the whole thing.

There is ample evidence that teamwork exists more in some place than in others. Those differences do not just happen. We also know that even within a given group teamwork fluctuates almost from day to day, and these changes do not just happen. Teamwork is a product of morale; morale is a human thing, and all human factors fluctuate.

Teamwork can be quickly destroyed by changes which adversely affect the morale factor. By the same token, teamwork can be improved—in fact, created out of nothing—if the morale factor is favorably affected by change.

Wherever a high degree of teamwork exists, someone has learned, either through experience, trial and error, or formal training, how to take his cue from those he leads as to what needs to be done. Each worker must be convinced that through participation as part of the team his or her personal needs and objectives can be satisfied to a greater degree than by any other means.

Now I will probably be giving away trade secrets—not mine or yours, unless you happen to be a union business agent—by emphasizing that all recent labor history indicates that more wages and more fringe benefits have settled nothing. Such things long ago ceased to be the important "needs" of employees. If that isn't clear after six or seven rounds since V-J Day, it will never be clear.

Many more union demands, more strikes and industrial disturbances, some of them on wage issues, will be seen. When a large group of workers feels that something is wrong or missing and they cannot quite identify their needs, it is not difficult to get them to raise hell about wages, which are something everyone understands.

There will be seen more and more non-payroll, non-economic bargaining issues which management will charge are invasions of its right to run the business. That is precisely what they will be.

We do not believe the average worker gives a hoot about any one of these "issues" or figures that taking away the right to manage from the proper corporate authorities is going to do him any good. However, despite all of his monetary gains, he still feels that something is missing. He doesn't feel secure. He doesn't feel adequate.

Even if you told him that what he really wants and needs is a genuine sense of "belonging"—"being part of"—"being a member of a great team," he probably would not believe you. But it can be demonstrated to him in time by foremen and supervisors who know the whys and wherefores of human behavior. **But management mustn't just ask "How Come—No Teamwork?" It must give the supervisor sufficient encouragement and authority to work it out.** It must provide him with up-to-date information and not expect each supervisor to learn by trial and error what competent researchers have already found out about human behavior.

We are on the threshold of a vast storeroom of new information on the general theme, "What motivates employees to work as a team." Groups of social scientists in several of our great universities, with the cooperation of enlightened management in various companies, including at least one large electric utility, are conducting extremely important and carefully planned studies of industrial situations to discover the answer to the question, "How Come—No Teamwork?"

Management must encourage and support research in the area of human behavior as it has so generously supported research in the physical sciences and for the same reason—to build a greater, more productive America.

No one can doubt the direction in which we are moving in every field of physical science. One can honestly doubt the extent and direction of our progress in the equally important field of labor-management relations.

Somewhere along the way we dropped an important part, one that securely couples the motor of management to the drive shaft of labor, and if we were to name it in a single word, it's "Teamwork." If it were made of steel all of our modern know-how would be applied to basic ingredients which are ages old and we would have a new and better coupling pin. So it will be with teamwork. When we apply our know-how to forging it again out of old-age human needs and desires, we will have solved most of our labor-management problems.

The Old Supervisor Speaks

I've handled a pick and a shovel,
I've sat at a bench in my time,
I've done heavy work in the heat and the murk,
I've known all the sweat and the grime;
And so, when some frosty-eyed expert
Talks, 'Labor' as if it was coal,
'A Commodity'—well, I just choke for a spell
Before I regain my control.

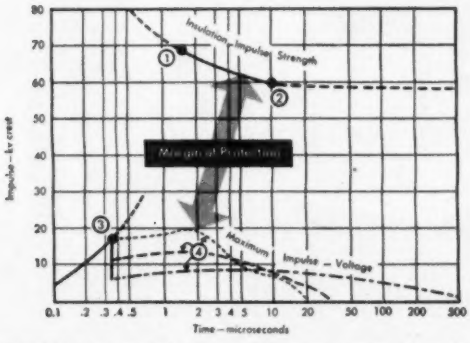
Now maybe I'm mossbacked and rusty,
But here's how it lines up to me:
Statistics will aid in the plans you have made,
They're useful to quite a degree,
But all of your lore scientific
Will fall down again and again
Unless in your brain this one fact you retain,
That 'Labor' means flesh and blood men.

In brief, it's a problem that's human,
No soulless 'Commodity' stuff,
And the very best plan I have happened to scan
Is just to be human enough;
And when it is finally settled
(I fear I won't be here by then)
It won't be by art of a book or a chart,
But Men dealing fairly with Men.

—*Anonymous*

G-E PELLET ARRESTERS are also unequalled in durability—they're the only distribution arresters with series gaps sealed in dry, inert nitrogen. Gap electrodes stay bright as new. The Pellets, themselves, are unaffected by service moisture.

No other distribution arrester protects so well



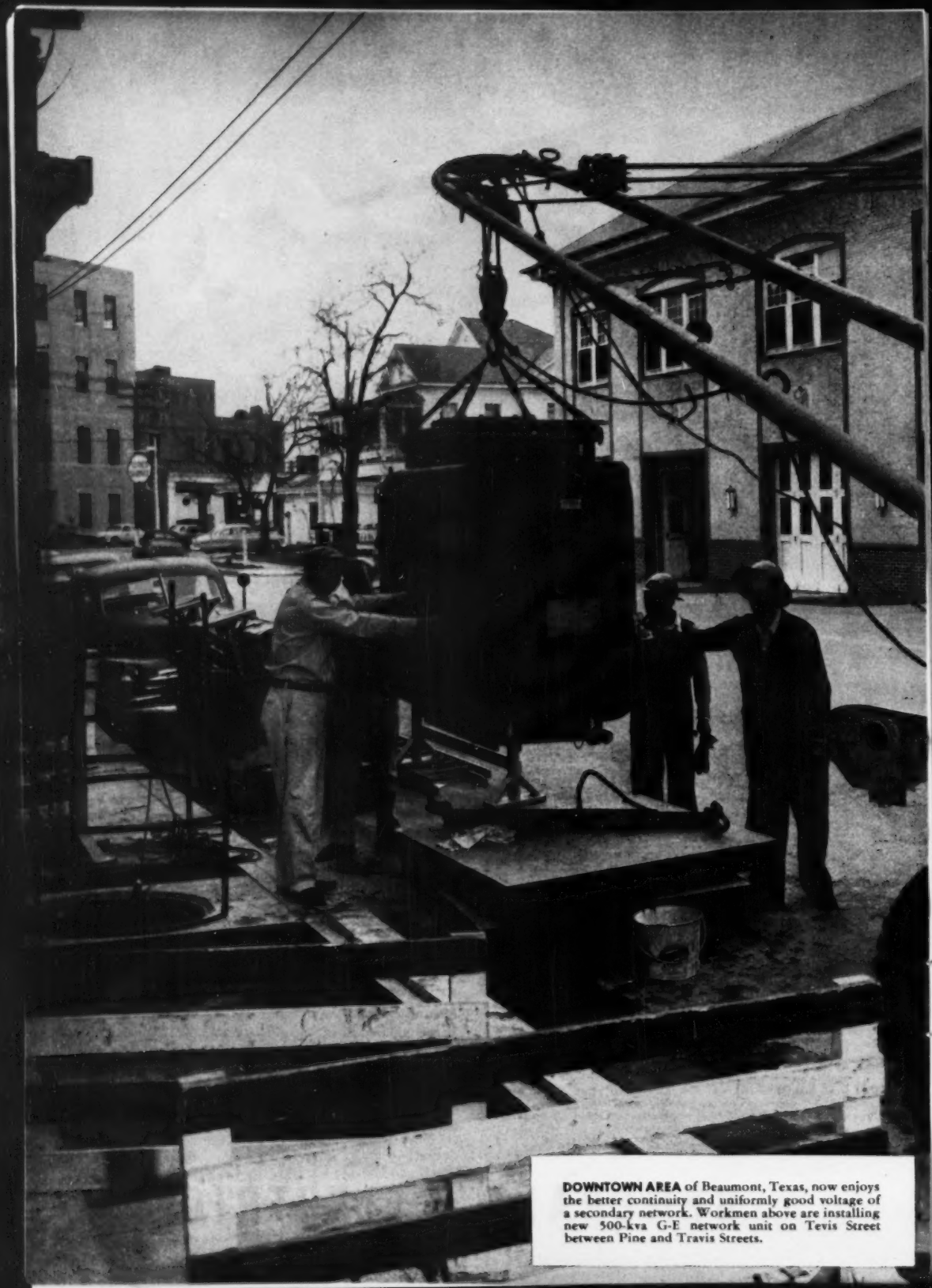
THIS GRAPH was made from actual volt-time and ampere-time oscillograms, and from AIEE standard test data. The demonstrated impulse strength of 2400-volt distribution transformer insulation is represented by the curve passing through: (1) the minimum impulse strength on an AIEE standard chopped wave test, and (2) the minimum impulse strength on an AIEE standard full-wave test. The impulse voltage allowed by a 3-kv General Electric Pellet Arrester is determined by (3) the impulse sparkover voltage of the arrester on the AIEE standard test wave, and (4) the IR drop across the arrester to ground with (top line) a 65,000 ampere discharge—(middle line) a 20,000 ampere discharge—and (bottom line) a 1500 ampere long duration discharge. The arrows show the unequalled margin of safety.

HERE'S THE EVIDENCE. The graph at the left, from actual volt-time and ampere-time oscillograms, shows the unequalled margin of safety that a 3-kv General Electric Pellet arrester gives a 2400-volt distribution transformer. Higher rated arresters, protecting higher-voltage transformers, similarly show this unequalled margin of protection.

HERE'S THE REASON. This extra protection results from a combination of low sparkover voltage and exceptionally low IR drop. Whether lightning currents are high or low, with durations long or short, no other distribution arrester holds voltages to such low levels.

HERE'S YOUR CUE. The Pellet is a valve-type arrester for universal use on urban, rural, or industrial systems. It is available in ratings of 1 kv to 15 kv inclusive. This arrester has been the quality-standard for over 25 years—it's your cue for maximum protection. For further information contact your G-E representative or your authorized G-E agent. *General Electric Company, Schenectady 5, N. Y.* 405-41

GENERAL ELECTRIC



DOWNTOWN AREA of Beaumont, Texas, now enjoys the better continuity and uniformly good voltage of a secondary network. Workmen above are installing new 500-kva G-E network unit on Tevis Street between Pine and Travis Streets.

Beaumont installs a network to handle heavy load growth

Installation of this G-E network unit illustrates only step that will be needed in future to add new distribution capacity

As today's rapidly expanding urban loads make it difficult to perpetuate radial systems, more and more electric utilities install secondary networks.

They find that, once installed, a network gives them complete flexibility for solving load growth problems —on an orderly step-by-step basis—without any rearrangement of secondaries or service entrances.

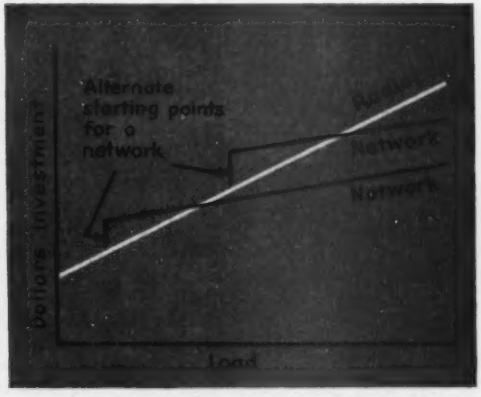
In Beaumont, Texas, for example, the Gulf States Utilities Co. found that it required extensive engineering calculations, juggling of existing loads and bolstering of circuits to meet increased loads in the downtown area. As a result it retired its radial system in favor of a network.

NO MORE LOAD GROWTH "HEADACHES". Now, when rising loads require additional capacity, all that will be necessary will be additional network units. With a network, service connections and low-voltage connections are provided initially thus eliminating any need for rearrangement or re-enforcement when a new transformer is added.

HELP FOR YOUR SYSTEM. If you, too, are struggling to accommodate new loads by perpetuating a radial system and your load density has risen to approximately 10,000 to 15,000 kva per square mile, it may be time for you to investigate the flexibility and economy of a secondary network.

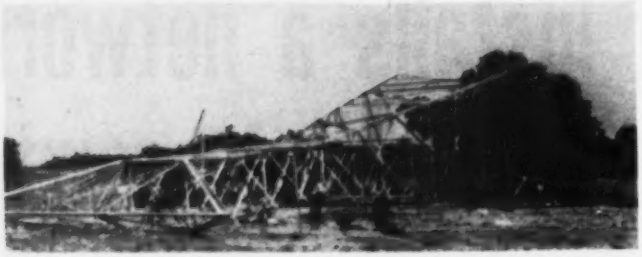
For help in solving your network problems, and for complete information on the many advantages of G-E standardized network units, get in touch with your local G-E Apparatus sales office. Or write to Section 402-129 for Bulletin GEA-5024. General Electric Company, Schenectady 5, N. Y.

VAULT SIZE MINIMIZED when you install G-E standardized network equipment since both high- and low-voltage cable terminals are well below the top of the transformer. Vault depth need be only 7 feet to roof slab to provide sufficient room for maintenance and inspection.

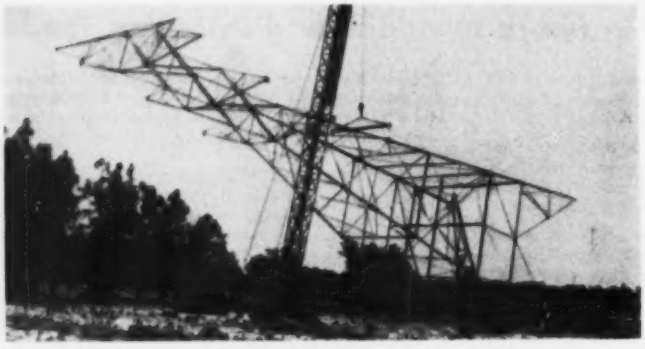


IT PAYS TO START A NETWORK. Although the change from a radial system to a network system means some initial expense, future increases in capacity require less investment with a network. And with a growing load, the sooner the network is started, the lower the ultimate cost.

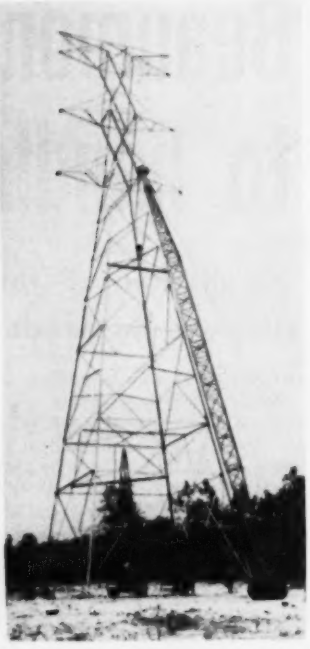
GENERAL ELECTRIC



ON GROUND, tower is completely assembled from steel spotted at foundation



PARTIALLY RAISED by specially built 85-ft derrick mounted on two caterpillar treadtracks. Pole setting tractor is used to control and steady movement of tower base



IN POSITION, tower is being bolted to anchor steel. Guy cables attached to derrick

Preassembled Towers Save $120 Each

W. L. PILSBURY, Supt of Transmission, Construction and Maintenance, Florida Power Corp

The preassembly method of erecting 110-kv transmission line towers actually saves approximately $120.00 per tower compared with the usually employed piece-by-piece method in the construction of a line between our new Higgins plant at Oldsmar and the Fort Meade substation.

The project consists of the erection of 368 steel towers over a distance of 71.72 mi. Three different type towers are being used—tangent suspension, medium angle strain, and large angle strain.

These towers were designed to support two 3-phase 110-kv 4/0 copper circuits together with two ⅜ in. (seven No. 8) copper-weld overhead ground wires. At present only one circuit and one overhead ground wire is to be installed.

All three type towers are 113.5 ft in height and have a 30-ft spread at the base with the exception of several tangent suspension types to which a 9-ft extension has been installed for added height. This extension makes a height of 122.5 ft and gives it a spread of 32 ft, 7½ in. at the base. The weight of the tangent suspension towers is 12,930 lb and with the 9-ft extension the weight is 16,060 lb. The medium angle and the large angle strain towers weigh 18,100 lb and 19,520 lb respectively.

In order to facilitate erection, the steel towers are completely assembled on the ground and then set up as a unit and connected to the anchor steel in the concrete foundation which had previously been installed.

The length and weight of the preassembled towers presented a problem as to the equipment needed to raise them to an upright position and get them established on the foundations.

The Southeastern Utilities Service Co of Miami, who are the erection contractors, designed and built in their shop an 85-ft derrick for this purpose.

This derrick is mounted on two caterpillar treadtracks for a base and is attached to a TD-14 tractor with a rigid draw bar and tongue arrangement to hold the base of the derrick in place. Cables are attached to the top of the derrick and anchored in four directions. The lifting cable is operated from the tractor winch.

The derrick can be partially lowered by a hand winch which is mounted on the draw bar-tongue and in this position can be hauled to the next location by the tractor to which it is attached.

A TD-9 tractor equipped with a pole-setting gin is used to steady and control the movement of the base of

(*Continued on page* 150)

1 Type PM-18 is a portable, easy-to-operate oscillograph that can provide up to four traces. Ideal for measurement of the operating speeds of relays and circuit breakers.

2 Type PM-10 will make records up to 1200 fpm of overload, short circuit, charging of transformers and transmission lines, welding, reactors, and many other phenomena.

3 Type PM-13 locates line faults quickly. Starts in 1/240 second, records entire disturbance, and stops after fault is cleared. Makes as many as 100 oscillograms without attention.

FOR ACCURATE POWER SYSTEM ANALYSIS . . .

G-E Offers Complete Line of Oscillographs

Automatic monitoring and staged-testing with G-E oscillographs are means of making sure that your power system is operating properly. That's why you may need several oscillographs—ones that perform all the functions expected of them, easily and with the minimum of maintenance.

Shown above are three G-E oscillographs that have proved popular with many utilities. Fig. 1 is the low-cost PM-18. Available with Polaroid-Land camera and continuous-drive record-paper holder, this light-weight model is ideal for trouble-shooting.

The type PM-10, shown in Fig. 2, is a twelve element oscillograph which provides simultaneous viewing and recording. The PM-13 in Fig. 3 can give performance information on circuit breakers, relays, current transformers, and system stability, and can locate faults.

For more information about these three oscillographs, contact your nearest G-E Apparatus Sales Office, or send the coupon at the right for product bulletins.

Section 605-27
General Electric Company
Schenectady 5, New York

Please send me a copy of the following bulletins on oscillographs.

√ for reference only
× for planning an immediate project

☐ PM-10 Oscillograph GEC-449
☐ PM-13 Oscillograph GEC-396
☐ PM-18 Oscillograph GEC-580

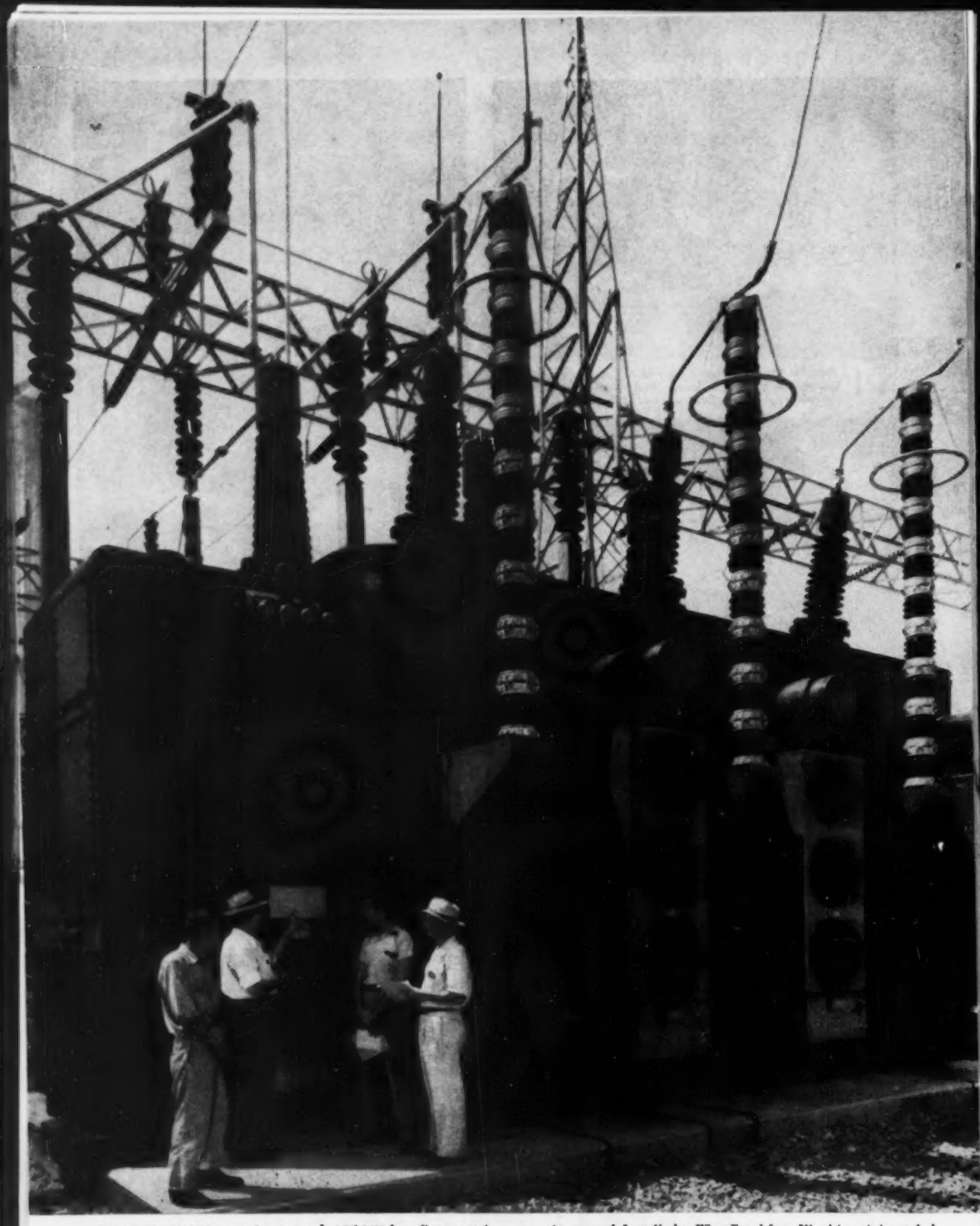
Name _____

Position _____

Company _____

City _____ State _____

GENERAL ELECTRIC



ONE-PIECE TANK contains record 156,000-kva "concentric layer" autotransformer and the series transformer for load-ratio-control. Installed at West Frankfort, Ill., this unit is cooled by the directed flow of forced oil through the windings and core.

230-kv "CONCENTRIC LAYER" autotransformer packs record 156,000 kva in one-piece tank

New unit for Illinois Power Company shipped upright in one-piece tank to minimize installation expense

Built for the Illinois Power Company of Decatur, Illinois, this G-E "concentric layer" autotransformer rated 156,000 kva (output) will tie a 230-kv system to a 138-kv system to help supply power for an atomic energy plant at Paducah, Kentucky.

Weight, size held down. The use of "concentric layer" high-voltage windings permitted the entire core and coil assembly, including the load-ratio-control series transformer, to be fitted into a one-piece tank which was small enough to be shipped upright, ready for installation.

In this winding, the conductor is wound in concentric layers separated by cylinders of insulation. These layers are connected in series so that voltage stresses between the layers and between high- and low-voltage windings are only the voltage of one layer. Bulky insulation between high- and low-voltage windings is not required since the necessary insulation is distributed efficiently throughout the winding. Weights and dimensions are substantially reduced permitting a larger kva unit to be shipped upright in a single-section tank.

High impulse strength is inherent in "concentric layer." There are no harmful oscillations under impulse because voltage distribution is essentially uniform throughout the winding. As a result, voltage stresses can be calculated accurately, and insulation applied precisely.

For power systems, 161 to 330 kv and higher. If you use or contemplate using 161 to 330 kv or above in high-capacity ratings, it will pay you to review the data on "concentric layer" design. Ask your local G-E Apparatus Sales representative for bulletin GER-129, or write to Section 401-36, General Electric Company, Schenectady 5, New York.

LOWER WEIGHT and smaller size of "concentric layer" design results from improved space factor—elimination of bulky insulation between low- and high-voltage windings.

SHIPPED UPRIGHT on a special drop-frame railroad car, this 156,000-kva "concentric layer" unit was installed easily without the use of cranes or other hoisting facilities.

GENERAL ELECTRIC

Preassembled Towers

(*Continued from page* 146)

the tower as it is being lifted and placed in a vertical position to connect to the foundation anchor steel.

Using this equipment the eleven-man erection crew which consists of one foreman, four operators, one lineman, and five groundmen, will average setting five towers per day when there are no obstructions on the right-of-way to prevent equipment being moved forward approximately 1,030 ft to the next tower location.

The average is only three per day when obstructions such as swamps, rivers, ponds, farm land, mining areas, highways and railroad crossings are encountered making it necessary to move equipment off the right-of-way in order to pass obstructions.

In order to have towers assembled ready for the setting crew, it was necessary to set up four 10-man crews who assembled five towers per day. This assembling crew is supplied with the steel by a 10-man hauling, sorting and spotting crew. This hauling crew obtains the steel from various railroad siding storage places and spots the necessary pieces at the tower locations ahead of the assembling crew.

Current Preference in Control Cable Design

W. T. PEIRCE, Chief Cable Engineer, American Steel & Wire Co, Worcester, Mass., and also Chairman Subcommittee 9 AIEE, Insulated Conductors Committee

Cross-sectioning the present thinking for control cable design was done by a questionnaire submitted by a subcommittee of the Insulated Conductors Committee of AIEE, to engineers representing utilities, industry and engineering firms. While results show no clear agreement for a preferred cable design, a large majority prefers a non-metallic jacketed cable, while Polychloroprene is the preferred jacket material.

55% of those indicating a preference would use conduit installation. Some 81% prefer sizes 12 or 9 for usual control cable. While 62% prefer 19 wire stranding, the 38% that use solid or 7-wire strand are some of the larger users for whom cost savings are greater. It is questionable if 19-wire strand is necessary for control cable.

Distribution of Replies

Privately owned public utilities	41
Publicly owned public utilities	10
Industrial plants	8
Cable manufacturers	6
Engineering firms	5
Total	70

For single conductor cables in trays, conduits and direct burial, 41% preferred oil base rubber and 28.6% heat and moisture rubber for insulation, 61% preferred polychloroprene and 22% braids, 15% polyvinyl chloride for covering.

For multiple conductor cables in trays, conduit and direct burial, 42% preferred oil base rubber and 26% heat and moisture rubber for insulation. 60% preferred polychloroprene, 8% braids, 18% polyvinyl chloride, 14% lead for jackets.

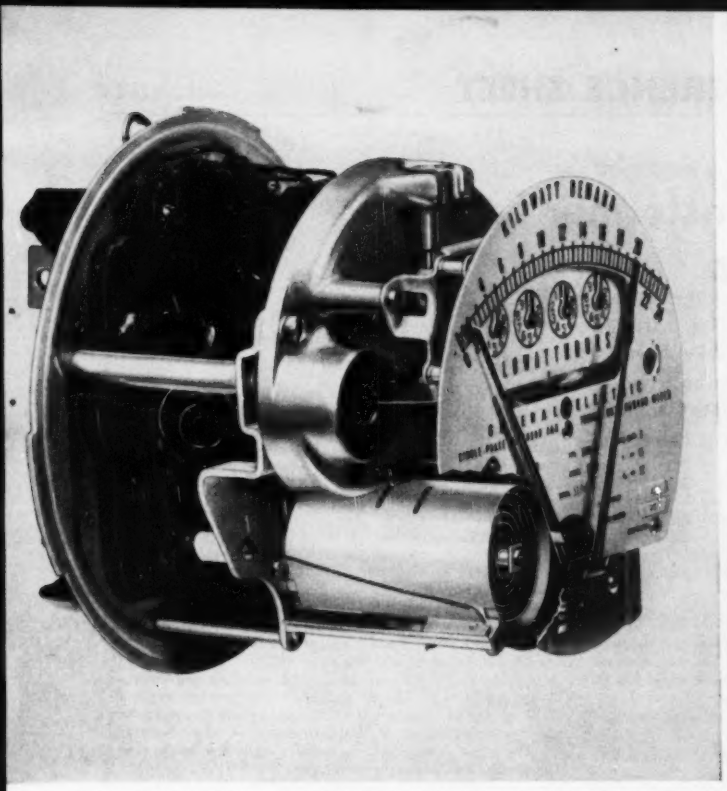
For jacketing individual conductors in multiple conductor cables, 66% prefer polychloroprene. About 10% prefer a jacket on lead-sheathed cables to prevent corrosion.

84% use color coding of multiple conductor cable, either by colored or striped jackets or colored cotton braids.

These replies indicate engineering preferences, and are not necessarily the current company practice.

Types of Insulation, Methods of Installation, Number and Order of Preferences

	Single Conductors									Multiple Conductors								
	In Trays			In Conduit			Direct Burial			In Trays			In Conduit			Direct Burial		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Oil base rubber and braid	2	2	–	4	4	1	1	–	–	3	2	–	2	1	1	2	1	–
Oil base rubber and lead	1	–	–	1	–	1	1	–	1	–	–	–	4	–	–	1	1	–
Oil base rubber and Neoprene	15	3	–	22	5	–	9	1	–	21	3	1	18	5	1	15	2	1
Oil base rubber and Neoprene armored	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	1	2	–
Heat and moisture rubber and braid	1	3	–	2	4	1	–	–	–	–	2	–	–	–	–	–	–	–
Heat and moisture rubber and lead	–	–	–	–	–	–	–	–	–	1	3	–	2	3	–	2	3	–
Heat and moisture rubber and Neoprene	13	4	2	15	7	1	8	1	–	17	5	4	12	10	5	8	3	4
Polyvinyl Chloride and P.V.C. jacket	4	4	4	13	6	4	2	2	–	9	5	4	10	10	3	5	5	2
Polyvinyl Chloride and lead	–	–	–	–	–	–	–	–	–	–	–	–	2	1	1	1	2	–
V. C. and braid	2	1	–	6	3	–	–	–	–	1	–	1	–	1	–	–	–	–
V. C. and lead	–	–	–	(Hot Locations)			–	–	–	2	1	1	2	1	2	1	1	2
A.V.C. and braid	2	–	–	10	1	1	–	–	–	2	1	–	3	–	–	–	–	–
A.V.C. and lead	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Latex and Neoprene	–	–	3	1	–	3	–	–	2	–	–	1	1	1	–	1	–	–
Polyethylene and PVC	1	–	–	1	–	1	–	–	–	1	2	1	4	1	1	1	1	1
Performance grade rubber and lead	–	–	–	–	–	–	–	–	–	1	–	–	3	–	–	–	–	–
Performance grade rubber and Neoprene	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	–



CUT-AWAY OF TYPE IHM METER SHOWS HIGH-EFFICIENCY "DIRECT-HEAT" SPIRALS.

How G-E Thermal Demand Meters Reduce Your Metering Costs

Reduced maintenance—shorter testing time—less frequent periodic tests possible—these are the ways that G-E Watthour Thermal Demand Meters reduce the metering costs of electric utilities.

LOWER MAINTENANCE COSTS result from the larger, sturdier parts permitted by the high-efficiency thermal demand element. This "direct-heat" unit, with the heat developed in the bimetallic spirals, produces a greater pointer torque, giving higher accuracy with less maintenance.

WIDE LIMIT ACCURACY of the watthour meter unit assures highly accurate registration at both high and low loads. Such I-50 features as surge-resistant retarding magnets die-cast into a one-piece aluminum frame help maintain this accurate performance and assure permanent stability.

1 METER DOES 2 JOBS. Type IHM meters measure both kilowatt hours and kilowatt demand, and are ideal for such applications as small industrial, commercial, and large domestic customers. For complete information, call your G-E representatives; or write for Bulletin GEC-1007, General Electric Company, Section 601-88, Schenectady, New York.

GENERAL ELECTRIC

TESTING AND CALIBRATION costs are reduced with IHM meters because desired indication is quickly obtained in test-board overloading.

EASY INSTALLATION is possible because IHM watthour demand meters can be used with standard meter sockets and connection boxes.

ACCURATE READINGS, maximum legibility result from IHM's large scale and knife-edge pointer—designed for easier meter reading.

Three-Phase Transformer Banks On Wye Circuits

Good installation practice for distribution transformers on 4-kv and 12-kv lines is presented. Undesirable methods to be avoided are discussed. Information is adapted from a standard practice letter of Alabama Power Co

PREFERRED VOLTAGE . . . Preferred primary voltage ratings of line transformers for power banks shall be equal to phase-to-neutral voltage regardless of whether a neutral is carried along the pole line. Where transformers of phase-to-phase voltage ratings are available in stock, they may be used. Type CSP and HSBA transformers shall be banked only in emergencies but should be replaced as soon as possible.

THREE TRANSFORMERS VS TWO . . . With wye-delta banks, it is desirable that three transformers be used. Two transformers (open-wye) introduce considerable current in the line neutral. This current (amperes) is equal to the current which would flow if total load were single phase, served by line-to-neutral transformer.

This neutral current and attendant unbalanced phase currents cannot be balanced-out properly on feeders by single-phase transformer loads, but only by other similar banks rotated on the phases.

Poor neutral current balance, which usually results, requires higher ground relay settings at the substation. Phase currents of an open-wye bank are distorted and voltage drop in one phase will be greater than in the other. Further, line voltage drop caused by an open-wye load is more than twice the drop caused by the same load balanced on three wires.

Thus open-wye banks should be limited in size, especially when distant from the substation. These limitations do not apply to transformers with phase-to-phase voltage ratings. Banks with open-delta primary connections may be used wherever they prove economical.

WYE-DELTA BANKS . . . On wye-connected primaries and delta-connected secondaries all three-transformer banks shall have the bank primary neutral insulated for full line voltage. Neutral shall be left isolated from line neutral and ground provided transformer sizes meet certain requirements.

In a wye-delta bank serving both three-phase and single-phase:

1. The "common" transformer—the one across the secondary wires which serve the single-phase load—shall have a capacity of ⅓ three-phase load in kva plus ⅓ single-phase load in kva.

2. Each of the remaining transformers shall have a capacity of ⅓ three-phase load in kva plus ⅓ single-phase load in kva.

In determining the actual sizes of the units, proper consideration should be given to overload capacity of 135% of nominal rating. Where existing wye-delta banks have primary neutral grounded, the ground should not be removed until transformer capacities have been calculated as above and found satisfactory.

Primary Metering. Consider wye-wye connected potential transformers installed for primary metering with power transformers on the primary connected wye. Primary neutral of potential transformers always shall be connected to line neutral and grounded. This is to be done whether power transformer bank neutral is grounded or floating.

On existing installations, potential transformer neutral may have been connected to floating neutral of transformer bank. This connection may be left unchanged unless one or more single-phase transformers are connected phase-to-neutral on metered primary. In this case potential transformer neutral shall be grounded.

Primary Load Balance. Where more than one wye-delta bank is on a line or a line section, larger transformers shall be connected to different line phase wires to maintain load balance.

Tap Setting. When a wye-delta bank is installed on a 3-wire, 12-kv line, transformation ratio on the bank is different from ratio on the phase-to-phase lighting transformers on the line. If transformers in bank are operated at full winding, secondary voltage on bank will be 3.77% less than secondary voltage on lighting transformers. This should be considered in determining bank-tap setting.

Emergency Connections. If one transformer in a wye-delta bank fails and there is no spare immediately available, service may be restored at reduced capacity by disconnecting the faulty transformer and connecting the bank floating neutral bus to the line neutral. However, this connection shall not be made by grounding the floating neutral where the pole line does not carry a neutral wire. Resulting large neutral current flowing in the earth will interfere with telephone service.

Also, grounds on the secondary, cases and lightning arresters will not handle such current properly. High voltage might be introduced on the secondary if the operation were continued very long. If transformers are of relatively large size, effect of neutral current must be determined. In some cases it will be necessary to render any ground relays inoperative.

OPEN-WYE BANKS . . . In some cases it is permissible, and may be preferable, to install an open-wye/open-delta transformer bank if load to be served is quite small, or if single-phase load is relatively large compared to three-phase load. Because several factors must be considered, no hard and fast rules can be established. In general, it may be said that an open-wye bank probably will be satisfactory if a single-phase-to-neutral transformer could serve existing load were it all single phase.

Sizes of the transformers in an open-wye/open-delta bank which serves both three-phase and single-phase loads must meet these requirements:

1. The "common" transformer—the one which serves the single-phase load—shall have a capacity equal to single-phase load in kva plus 58% of three-phase load in kva.

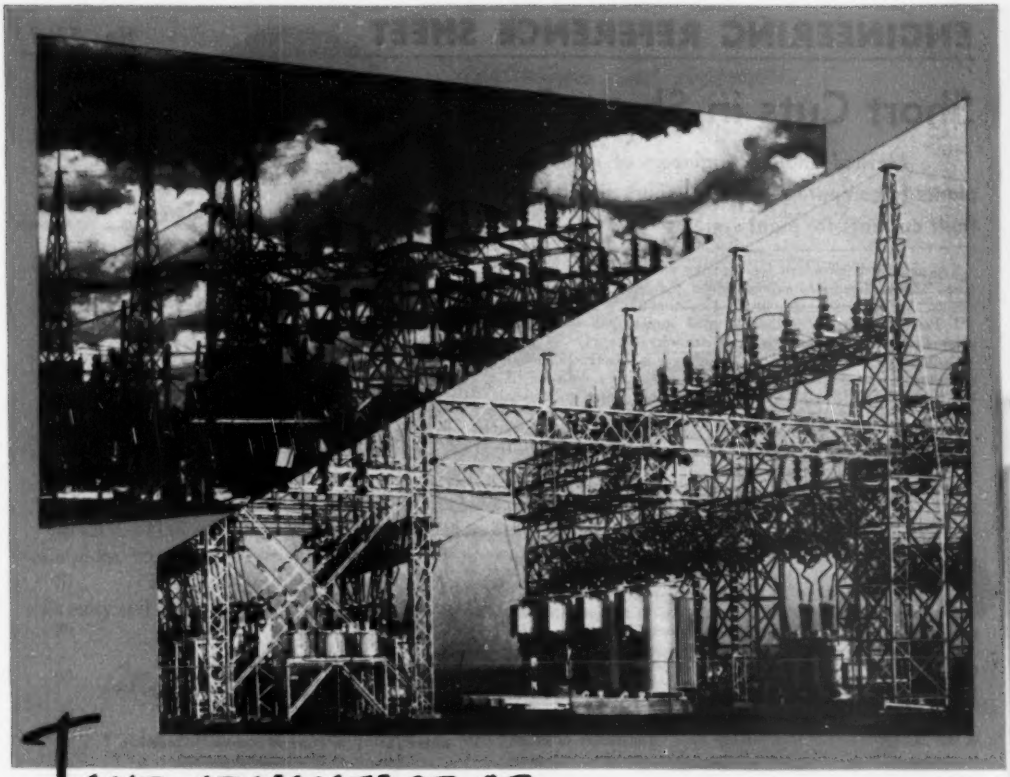
2. The remaining transformer shall have a capacity equal to 58% of three-phase load in kva.

In determining actual sizes of the units, proper consideration should be given to overload capacity of 135% of nominal rating.

Neutral Current. Maximum primary neutral current from an open-wye/open-delta bank is the sum of single-phase and three-phase loads in kva divided by phase-to-neutral voltage in kv. Actually, with load power factors ordinarily experienced, neutral current would be slightly less than the value thus obtained. However, this method will give a safe value for checking ground relays settings.

Primary Load Balance. When more than one open-wye/open-delta bank is on a line or a line section, the several installations shall be connected to different phases to equalize as nearly as possible the total connected kva of such banks on each separate phase.

WYE-WYE BANKS . . . Where a "network" secondary voltage of 120/208 Y v is required, bank must be connected wye on both sides and transformer primary neutral connected to line neutral. A wye-wye bank must not be operated without this neutral connection. Such a bank shall not be installed where there is no neutral wire.



TAKE ADVANTAGE OF

DELTA-STAR'S SUBSTATION EXPERIENCE

to reduce engineering costs — save your time

Delta-Star has been designing and building substations for the nation's expanding utilities for more than 30 years—and many of these stations have been repeat orders from companies who are more than satisfied with Delta-Star's resources and service.

DELTA-STAR has the knowledge based on proved design and engineering skill, and has worked out a practical standardized system of handling which reduces the time required for planning, fabrication and shipment to a minimum.

DELTA-STAR has the facilities. Component parts for equipment are in stock ready for assembly. Structural steel is accurately cut and punched, then hot-dip galvanized under precise control in our own shops. Careful checking and marking before shipment insures a "custom" fit.

Every detail from anchor bolts to switching equipment is covered by drawings in the construction folder for quick and easy erection.

We shall be happy to consult with you on your substation requirements for any voltage rating and submit data on design, cost and delivery. Contact factory or nearest district office.

WHEN YOU WANT THE BEST IN HIGH VOLTAGE SWITCHING EQUIPMENT SPECIFY DELTA-STAR

DELTA-STAR ELECTRIC COMPANY
DIVISION OF H. K. PORTER COMPANY, INC.
2437 Fulton Street · Chicago 12, Illinois
DISTRICT OFFICES IN PRINCIPAL CITIES

Short Cuts in Short Circuit Calculations

Method enables engineers of industrial plants to compute readily the short circuit and fault currents for plant systems

FRANK E. REEVES, Electrical Engineer
Ebasco International Corp, New York, N. Y.

Recommended procedure for reducing computation to a minimum follows. Computed values are not too far at variance with results obtained from more involved calculations.

1. Percent reactance method is used rather than the ohmic method. Percent reactance is determined by Eq. (1).

Cable and overhead line ohmic impedances or reactances should be converted to percent impedances or reactances on selected kva base by Eq. (2). (When using impedance values substitute Z for X in the equation.)

Transformer impedances in percent of rated kva are obtained from nameplates, manufacturers or tables, and should be referred to the selected kva base by Eq (3).

Generator transient and sub-transient reactances are given in percent of rated kva by manufacturers and should be converted by Eq (3).

2. A kva base of 10^3, 10^6, 10^4, 10^5 or 10^6 (round numbers) is more convenient than total system generating capacity or largest generating station. The base selected depends on the size of generators and magnitude of the impedances involved.

When magnitude of short circuit at the fault is to be determined, prime objective should be to combine reactances and/or impedances until the net reactance or impedance, viewed from the point of actual or assumed fault, is obtained. Short circuit kva should then be determined by Eq (8).

Short circuit current is determined by Eq (9).

3. Resistances of lines and apparatus may be neglected, as in the case of overhead high voltage lines. Resistances of multi-conductor cables, or single conductor cables used in close proximity as multi-conductor cables, are usually appreciable as compared with their reactances. Impedances in such cases should be used instead of reactances. However, these impedances may be added arithmetically to reactances without appreciable error unless they constitute a major part of the net impedance to the fault.

4. Total kva at the fault may usually be obtained by adding arithmetically the contributions from the various generating stations.

5. When percent reactance or impedance of all components of a power system are referred to the same base kva, components in series may be added arithmetically, and components in parallel may be combined by evaluating the reciprocal of the sum of their reciprocals. For reactances or impedances in parallel use Eq (4). (When using impedance values substitute Z for X in the equation.)

Percent subtransient reactances, referred to the base kva, of all generators in the same station are combined in the above manner so that the entire station may be represented by a single generator.

If current limiting reactors are connected in the bus, the group of generators on each side of the reactors must be combined (see previous paragraph). Bus reactors are added arithmetically to the proper group net, depending on the location of the fault whose magnitude is being determined.

Percent reactance or impedance of a transformer in a branch of a system may be added to the feeder reactance as if it were a series reactance. No allowance need be made for a change in voltage through the transformer since all values are based on kva.

Ohmic values of cables are obtained from tables, are given on a per-phase basis, and may be converted directly to percent reactance on base kva by using Eq (2).

Ohmic values of open-wire lines are obtained from tables. Values of X_a are for conductor internal reactance plus reactance for 1-ft spacing, and values of X_d for separation are in inches and in feet for triangular symmetrical spacing. In the "inch" table, values for separations of less than 1 ft are negative, indicating they must be subtracted from the corresponding values of X_a. Values for over a foot are added to X_a. For irregular spacings, the equivalent symmetrical triangular spacing (D) values are determined by Eq (10) where A, B and C are the distances between conductors.

To determine interrupting capacities of circuit breakers, 3-phase short circuit current values are usually adequate. For 8-cycle breakers, no multiplier is necessary; but for 5-cycle breakers a multiplier 1.1 is used, for 3-cycle, 1.2, and for 2-cycle, 1.4. These multipliers are necessary because generator short circuit current is initially high but decays with time. Equipment must be capable of withstanding mechanical stresses produced by initial asymmetrical value of current. For mechanical stresses and momentary ratings of buses and circuit breakers, a multiplier of 1.6 is used.

$$I_N \,\%\, X = \frac{I_N \times X}{V} \times 100 \text{ (by definition)} \quad (1)$$

$$\%\, X @ KVA_B = \frac{KVA_B \times X}{(KV)^2 \times 10} \quad (2)$$

$$\%\, X @ KVA_B = \%\, X @ KVA_R \times \frac{KVA_B}{KVA_R} \quad (3)$$

$$\%\, X_{Net} = \frac{1}{\frac{1}{\%X_1} + \frac{1}{\%X_2} + \frac{1}{\%X_3} \cdots \frac{1}{\%X_n}} \quad (4)$$

$$I_N @ KVA_B = \frac{KVA_B \times 1000}{V_L \times \sqrt{3}} \quad (5)$$

$$I_{SC} = \frac{I_N \times 100}{\%\, X} \quad (6)$$

$$KVA_{SC} = \frac{I_N \times V_L \times \sqrt{3}}{\%\, X \times 10} \quad (7)$$

$$KVA_{SC} = \frac{KVA_B \times 100}{\%\, X_{Net}} \quad (8)$$

$$I_{SC} = \frac{KVA_{SC} \times 1000}{V_L \times \sqrt{3}} \quad (9)$$

$$D = 3\sqrt{A \times B \times C} \quad (10)$$

where I_N = Normal current for base kva
I_{SC} = Short circuit current
V = Impressed voltage
V_L = Line voltage
KV = Kilovolts
KVA_B = Base kilovolt-amperes
KVA_R = Rated kilovolt-amperes
X = Reactance in ohms
$\%\, X$ = Percent reactance
Z = Impedance in ohms
$\%Z$ = Percent Impedance
D = Equivalent spacing

Percent reactance is the percent voltage drop caused by the flow of normal current through the reactance of the equipment. For a fundamental conception of percent reactance, consider a pure reactance across which line voltage is impressed. If rated current flows, reactance is 100%. If double rated current flows, reactance is 50%. If 20 times rated current flows, reactance is 5%. Last condition would be in the nature of a short circuit.

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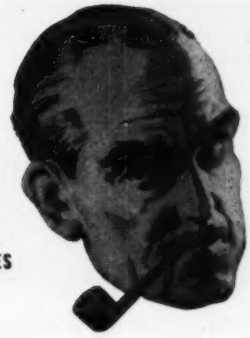


NO. 4 IN A SERIES

a transmission line engineer ASKS—

"is there an insulator that will reduce the effects of air pollutions ?"

here is the ANSWER:

Yes, there is. It is the PINCO L-1925 "UNIVERSAL" INSULATOR which is specifically designed to reduce to a minimum, the damaging effects of fly ash and other air-borne industrial wastes which tend to decrease insulator efficiency and create a costly operational maintenance problem.

and 5 reasons WHY . . .

1. Leakage distance of 17" is approximately 50% greater than 10" suspension unit.
2. Outside petticoats shielded above by bell; below by hood.
3. Long, tapered hood is self-cleaning; acts as a splatter-baffle to clean the petticoats.
4. In strings, interior of hood is shielded by unit below—protected against contamination, thus reducing manual cleaning requirements to a minimum.
5. Standard 5¾" spacing permits replacement of conventional 10" suspension units without re-sagging.

Service records over a period of 20 YEARS

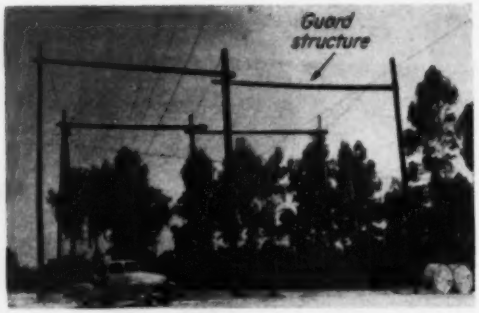
of continuous operation prove that thousands of these Pinco units have met their job requirements 100% in areas where excessive insulator contamination is an operational hazard. Certainly such a record of trouble-free performance proves that they're "right" where it counts . . . right on the job!

PINCO INSULATORS

The Porcelain Insulator Corporation ★ LIMA, NEW YORK

Sales Agents:
Joslyn Mfg. & Supply Co.
Offices in
Principal Cities

MIDWAY IN THE PULL the 66-kv conductors passed under an energized 220-kv line and the 66-kv tap to Katella substation. Two-pole guard structure with two cross beams guided moving line



GUARD STRUCTURE over highway is typical of 55 structures built over road and rail crossings. Splices in relocated 66-kv line had to be positioned so as not to span rail crossings or communication lines

Pulling New 220-Kv Line In with Old 66-Kv Saves $ $ $

BILL GRIFFIN, Construction Engineer, Stone & Webster Engineering Corp, Los Angeles, Calif.

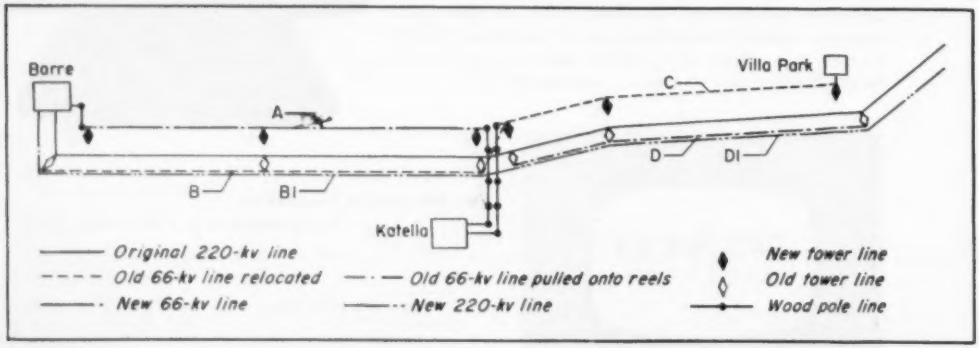
Combined operation of reinsulating a 66-kv line for 220 kv and pulling in the new conductors as the old were pulled to a new location saved an estimated $4,000 and twelve days' time for Southern California Edison Co. Operation involved stringing three 605,000-cir mils, 30/19 ACSR conductors for 220-kv on a double-circuit tower line, consisting of one 220-kv line and a 336,400-cir mils, 30/7 ASCR 66-kv line, simultaneously with pulling the lower voltage conductors to a new and paralleling position. Major pulling operation involved about 23,150 ft of 66-kv conductors plus up to 6,000 ft of 220-kv conductors on reels. Linemen used walkie-talkies to coordinate all activities along the line as three conductors were being pulled at once.

Before pulling began, a tower line for 66-kv was built parallel to the double-circuit line (see map). With this new line energized from Barre Substation into Katella substation, the old 66-kv line was de-energized, conductors were placed in traveler pulleys and the line insulated for 220-kv. Guard structures were built over all crossings, about 55 total. About midway in the pull, where the old 66-kv line was to be pulled under the energized 220-kv line, a two pole structure with cross poles was built to keep the 66-kv line from getting into the energized line.

To begin the pulling, an eye was served in the steel cores of both old and new lines and they were joined by figure-8 links. Sock lines attached to the pulling end of the 66-kv conductors were joined to a bridle which was pulled with a winch line by a tractor winch. Because the route goes through many orange groves, the tractor remained stationary instead of walking the line through.

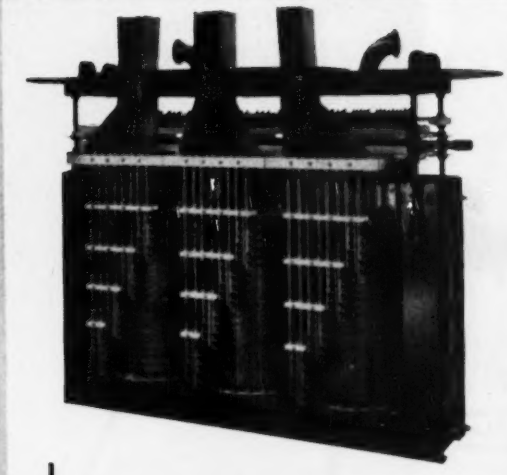
Use of sock lines eliminated the need for lowering conductors to the ground each time a tower was reached and prevented undue damage to the conductors. During pulling, when the bridle approached a tower, the winch line was slacked off and lowered to the ground. The bridle was released, moved ahead and attached to additional sock lines which had been strung beforehand on travelers suspended from the insulators on the tower. After the additional sock lines were attached by figure-8 links to the preceeding sock lines, the winch line was attached to the bridle and pulled ahead to the next tower.

At railroad crossings, sock lines were strung between two



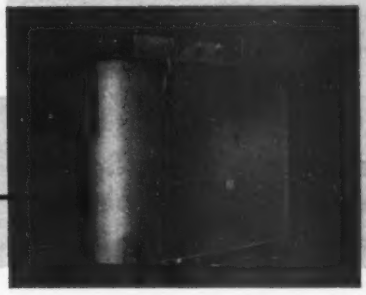
PULLING OPERATION done in two steps. After new 66-kv line (A) between Katella substation and Barre Substation had been energized, old 66-kv line (B) was moved to (C), pulling in new 220-kv line (B1). Line between Katella substation and Villa Park Substation (C) was energized and second portion of 66-kv line (D) was pulled onto reels. Second stretch of 220-kv line (D1) was pulled in simultaneously

100 kva... 25,000 kva...or higher...



Pennsylvania can build a Furnace Transformer for any size electric furnace

25,000 Kva Furnace Transformer, Low Voltage Side. 3 Phase, 60 Cycles, Water-cooled. High Voltage: 13800 volts. Low Voltage: 430 to 290 volts.



External view of transformer. Compartment on left houses motor-operated tap changer.

The successful operation of Pennsylvania Furnace Transformers and their industry-wide acceptance indicate that Pennsylvania engineers fully understand the application of furnace transformers to electric furnaces.

For example, in 1936 Pennsylvania introduced a new type of helical winding in the low voltage coils of a 2500 Kva furnace transformer. Since then, the same principles of coil design have been incorporated into Pennsylvania furnace transformers totaling over $1\frac{1}{4}$ million Kva. In all the intervening years, there has *never* been a low voltage winding breakdown on any of these furnace transformers.

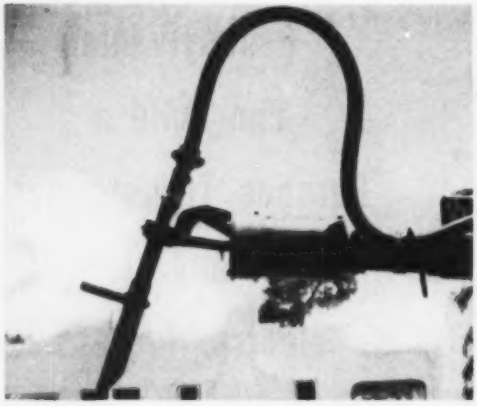
Because its engineering is basically and fundamentally correct, Pennsylvania can build furnace transformers for any size electric furnace now being manufactured or being contemplated for future construction.

Pennsylvania TRANSFORMERS
Furnace Transformer Experts

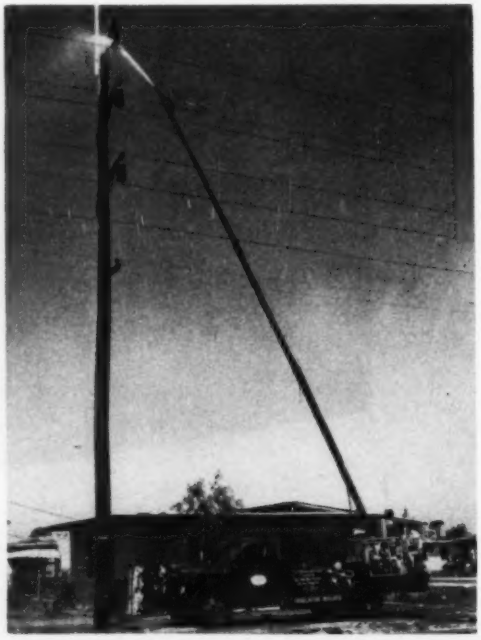
Pennsylvania TRANSFORMER COMPANY
CANONSBURG, PENNSYLVANIA
Greater Pittsburgh District

towers spanning the crossing and the bridle and winch line advanced one span. Sock lines were added at each tower until a large enough clearing was reached where they could be first pulled through the travelers and then laid in the field.

After the first length of old 66-kv conductors had been pulled into the new position, the line was energized for Katella substation to Villa Park substation to release the second portion of 66-kv line strung on the double-circuit line. Second stretch of 66-kv line was 4/0 copper and it was used to pull in the new 220-kv conductors after the line had been reinsulated for the new voltage and travelers hung on the insulators. Copper conductors were pulled onto reels and stored for future use.



CLOSE UP of the nozzle arrangement and control head. Most satisfactory nozzle orifice opening is 10/64 in. unless wind is over 15 mph or distances from insulators are over 6 ft—then 16/64 in. does better



WASHING INSULATORS on double circuit 66-kv line having 50-ft pole. With crew of two, insulators on 60 of these double-circuit poles have been washed in one 8-hr day

Insulator Washer Solves Contamination Problem

HENRY L. ALLEN, Supervisor Auto Equipment, Florida Power & Light Co, Miami, Fla.

A unique truck-mounted insulator washer has been designed and put in service by the Florida Power and Light Co, Miami, Florida. It has greatly improved service on both transmission and primary distribution circuits along the coastal areas as well as in metropolitan areas. Television and radio interference have been eliminated and flashovers have been reduced—by the removal of the salt encrustation and industrial deposits. Under favorable conditions a two-man crew (truck driver and crane operator) have washed all the four disc suspension-type insulators on 60-double-circuit 66-kv poles in one 8-hr day.

The unit was assembled and all controls fabricated by a local Miami truck equipment company. The total cost, including considerable experimentation and modification, was $7,800. Additional units are contemplated.

Tests . . . Prior to the selection of equipment, a series of tests were made with the full cooperation of the Miami and Dade County Fire Departments, which provided pumpers, hose and various types of guns and nozzles.

A generous coating of damp salt was applied to 66-kv suspension and pin type insulators which were mounted in position on a pole. Using an oil testing transformer, the conductors were energized with a potential of 35 kv to ground. Two milli-ammeters were used, one with a 15-ma scale for checking leakage through the nozzle and the other having a 250-ma scale for determining total leakage from conductor to ground.

Using a fog type gun set for approximately 30 ft cone of spray, a nozzle orifice of 10/64 in. and 150-psi pump pressure, the following results were obtained:

Distance—Nozzle to Conductors	Nozzle Leakage in ma
48 in.	0
30 in.	3.5
24 in.	4.0
12 in.	5.0
6 in.	13.0
4 in.	Off Scale
2 in.	50-ma Breaker Opened

The spray of water removed the encrusted salt deposits in from 4 to 10 sec depending on the type of insulator and

6 BIG REASONS WHY VICTOR PURIFIED PORCELAIN SWITCH and BUS INSULATORS ARE BETTER!

VICTOR NO. 742 (NEMA TR-No. 7). For complete engineering data on all Victor Switch and Bus Insulators, send for Bulletin No. 5.

1. Improved thermal resistance. Purified Porcelain, pure porcelain all the way through, expands and contracts more uniformly during sudden temperature changes.
2. Unmatched porcelain hardness and density, resulting in rock-like strength.
3. Higher average puncture values.
4. Better tension, torsion, cantilever and impact values.
5. Smoother, harder glaze with unequalled self-cleaning characteristics.
6. Finest insulator porcelain ever made—uniformity of quality never before achieved!

Specify VICTOR SWITCH and BUS INSULATORS

VICTOR INSULATORS, INC., VICTOR, N.Y.

TEN GOOD REASONS

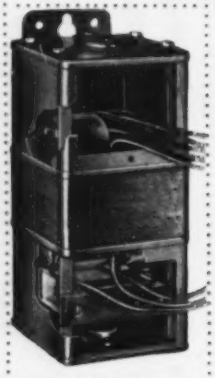
TO SPECIFY JEFFERSON MERCURY LAMP TRANSFORMERS

1. EASY MOUNTING!
Keyhole slots for easy positioning and two holes for locking bolts in both top and bottom brackets. Brackets are reversible or removable for messenger wire suspension, etc.

2. PLENTY OF KNOCKOUTS!
One-half and ⅜" knockouts in sides of wiring compartments at each end. Two ½" knockouts in each end plate.

3. INCANDESCENT & MERCURY LAMP LEADS, BOTH ENDS!
For fast, convenient wiring of combination mercury vapor and incandescent lamp fixtures. Mercury lamps can also be wired from either end of transformer.

4. THREE PRIMARY TAPS!
Color-coded tagged leads for positive identification and quick wiring. 3 primary taps (not 2) for close matching with line voltage.



5. DOUBLE VARNISHED CORE & COIL!
Oven baked polymerizing varnish impregnation assures permanent insulation and protection against moisture.

6. INTERCHANGEABLE FITTINGS!
Pryouts on both ends expose standard ½" conduit fittings for suspension type mounting of transformer and/or lamp. ¾" fittings quickly interchangeable.

7. AMPLE WIRING COMPARTMENTS!
Condenser located to provide full wiring space when any knockout is used. Solid U-Bracket mounting prevents vibration damage to condenser and leads.

8. NO OBSTRUCTIONS!
Plenty of wiring room between condenser and conduit fittings. Run wiring through lamp suspension conduit . . . save time, trouble, and outside wiring.

9. PRESS FIT RIVETED CORE!
For positive uniformity of manufacture and maximum quality.

10. TRANSFORMERS FOR EVERY APPLICATION!
Indoors, or out, Jefferson Transformers fill every demand. Normal and high power factor designs. Two lamp types are H.P.F. design. Outdoor types in deep-drawn cases for positive protection against moisture.

THESE EXTRA VALUES ARE YOURS AT NO EXTRA COST!

Only in the new line of Jefferson Mercury Lamp Transformers do you find *all* the extra-value features. You get maximum operating economy, full rated lamp life, and all around lighting satisfaction.

The extra values are yours in every model Jefferson Transformer — yet the cost is no greater than that of the ordinary transformer. Investigate now. There is no obligation.

JEFFERSON ELECTRIC COMPANY
BELLWOOD, ILLINOIS

New 16 page illustrated Bulletin 521-5 gives complete data on indoor and outdoor models for all H-1 400 watt lamps, and on the new Jefferson Transformers for both H-12 and H-15-1000 watt lamps. Write for your free copy now.

Jefferson Transformers

distance from nozzle to insulator. The water used was from City of Miami mains and had the following chemical analysis: Chlorides 58PPM, cell resistance at 85 F 390 ohms, and conductivity 234 micromhos corrected to 77 F.

Equipment Assembly . . . The truck chassis used is of 16,000 GVW capacity, 84 in. CA and 8.25x20x10 tires. A rectangular 1000-gal capacity tank mounted behind the cab, a 100-gpm 500-psi centrifugal pump direct driven by a 6 cylinder gasoline industrial engine, with necessary piping and valves, and a tubular steel telescopic crane of a type commonly used by neon sign erectors and repairmen. This crane consists of three sections, one telescoping within the others, maximum elevation at 70 deg angle is 50 ft. The entire boom assembly is rotated 360 deg by means of a hand crank and ring gear and pinion. When purchased and first placed in operation the boom was both elevated and extended by means of two 6-v reversible electric motors, but due to the speed and load demanded of these converted automotive starting motors in almost continuous operation, considerable trouble with burned-out brushes, armatures and wiring was encountered. The demand was 85 amp at 6 v on each motor in both extending and retracting and we estimate that one 8-hr day will necessitate operation of these motors more than would a year's operation by a neon sign contractor for which the light duty crane was designed.

This difficulty was overcome by the installation of a power take-off on the transmission of the truck, a hydraulic pump with tank and necessary valves and piping, and two hydraulic motors controlled by two self-centering two-way valves. This hydraulic operation not only provides a faster, but more positive movement than the original electrical installations. The elapsed time from carrying position in the cradle to full extension and full elevation is 65 sec.

The fog gun type nozzle is mounted on the end of the uppermost boom section and is controlled from the vehicle platform. This is accomplished by a planetary gear arrangement for 360 deg rotation and bevel gear and articulated rod for 70 deg elevation. Square telescoping tubing is installed inside the tubular boom sections and actuated by means of a wheel for the

(*Continued on page* 164)

Series AJ Helipot models are only ¾" in diameter and 1¾" long; weight 1.0 oz. Ten-turn 18" slide wire gives adjustment accuracy of 1/3000 in a 100-ohm unit—1/6500 in a 50,000-ohm unit.

Helipot

DRIVER-HARRIS

Cutaway view of Model A 10-turn Helipot precision helical potentiometer. Resistance element 45" long is contained in case 2" x 1-13/16" diameter. On element are wound 3000 to 9800 turns of resistance wire, depending on total resistance value required. Adjustment accuracy is 12 to 14 times that of conventional single-turn potentiometer of equal diameter.

To win consumer preference and assure customer satisfaction, Helipot Corporation is guided by a basic policy that has proved as effective as it is simple. It is: (1) to produce components of the highest precision, and (2) to realize the economies inherent in mass production.

By following these objectives, Helipot has become the world's largest maker of precision potentiometers, producing the widest selection of single-turn and multi-turn units available anywhere.

States Helipot: "Our policy of mass producing the highest precision potentiometers practicable, in order to deliver top quality at moderate cost, is reflected in the fact that standard linearity accuracy of all our stock models, selling competitively, is held to ±0.5%. Our reliance on Driver-Harris alloys such as Nichrome V, Advance, and Karma to provide resistance windings for many of our products constitutes a strong endorsement of Driver-Harris skills and reliability."

Driver-Harris takes particular pride in having played so important a role in the Helipot story, and is fully conscious of the responsibility the confidence of this famous manufacturer imposes.

Nichrome*, Advance*, and Karma* are at your service, too; as are more than 80 other alloys developed exclusively by Driver-Harris for application in the electrical and electronic fields. We feel confident that, like Helipot, you will realize outstanding advantages by putting one or more of them to work for you. Let us have your specifications. We'll be glad to make recommendations based on your specific requirements.

*T.M. Reg. U.S. Pat. Off.

Sole producers of Nichrome, Advance, and Karma

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BRANCHES: Chicago, Detroit, Cleveland, Los Angeles, San Francisco

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- **NEW LABEL!**
- **NEW RANGE OF APPLICATION!**

MINI

Fits like a fuse in any standard Edison base fuseholder!

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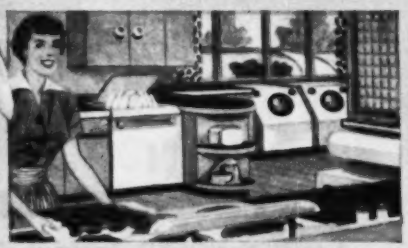
FOR RESIDENTIAL,
Produced in Three Ratings—



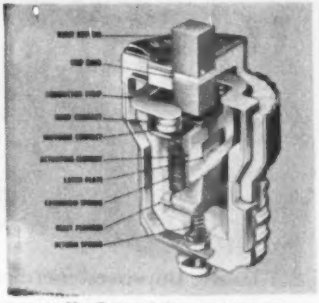
"No need to fuss with blown out fuses!" Millions of homes can now afford this new permanent circuit protection!

-BREAKER®

Now Listed and Labeled as a "Circuit Protector" by Underwriters' Laboratories, Inc.!

IMAGINE a circuit protective device so basic in concept, yet so revolutionary in design and operation that an entirely new product classification had to be established in order to permit its proper listing by Underwriters' Laboratories, Inc. Well, that's MINI-BREAKER! Because, though it fits like a fuse in any standard Edison base fuseholder, new MINI-BREAKER actually provides *permanent protection* against overloads and short circuits! Nor is it just another variation of conventional circuit breaker design. Because, while it's capable of meeting the most rigid test and operating requirements, MINI-BREAKER has no switch mechanism, no intermediate position.

That's why, after careful analysis, a new classification had to be created. That's why, today, MINI-BREAKER is the only device of its kind listed as a "Circuit Protector" suitable for both branch and main circuits . . . the only device of its kind now bearing the label of Underwriters' Laboratories, Inc.



INSIDE MINI-BREAKER! 25 precision built parts carefully assembled and permanently enclosed within a durable, protective insulating case. Only two movable sub-assemblies . . . and these operate only when required to break and make the circuit.

Easy to Install, Simple to Reset!

No wonder MINI-BREAKER takes a bow as "the most economically installed permanent circuit protective device on the market today!" Anyone can install MINI-BREAKER in a matter of seconds simply by screwing it into an Edison base fuseholder. No additional equipment required, no special wiring or rewiring necessary! *Anyone* can reset the device to restore service.

MINI-BREAKER is a rugged, precision built circuit protector. Dependable in operation, too. It safely interrupts all dangerous overloads and short circuits . . . tripping instantly on "shorts", but with a built-in time lag for handling temporary starting loads and line surges. Whenever an interruption occurs, however, service can quickly be restored . . . normally within 10 seconds . . . merely by pressing in and releasing the reset button. Simple! Yet, in spite of its quick recovery, MINI-BREAKER is 100% trip-free. That is, it positively will not maintain a circuit that has not been cleared of the condition that caused the interruption!

WANT MORE INFORMATION ON MINI-BREAKER? Regardless of what your interests may be, we'd like to tell you more about the amazing new MINI-BREAKER. A request on your company letterhead . . . or the coupon below . . . will bring you the complete story by return mail.

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- ✔ High dielectric strength
- ✔ Excellent thermal conductivity
- ✔ Top tensile strength
- ✔ Rot repellent
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NUTLEY 10, NEW JERSEY

*T. M. Reg. U. S. Pat. Off. by Owens Corning Fiberglas Corp.

Insulator Washer

(*Continued from page* 160)

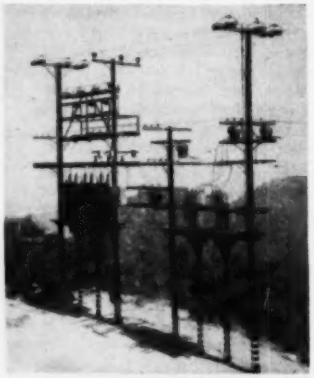
rotation and crank for the elevation of the nozzle.

The first method used for control of the nozzle was by two hand wheels. It was found that with operators concerned with elevating, extending and swinging the slender steel boom up between 66,000-v conductors, all operations should be as natural and free as possible. The crank was, therefore, installed for up and down movement.

The hose is supported by three rings on the bottom section and one ring on each of the two upper sections of the boom. A reel is provided to roll the hose on as the boom is retracted. The complete unit is bonded and a reel type grounding device is used to ground the unit to the pole ground.

Various tests with different nozzle orifices have been made, with openings of 5/64 in. up to 16/64 in. being used. We have found the 10/64 in. opening most satisfactory unless wind above 15 mph or distances from the insulators over 6 ft are encountered; then the 16/64 in. would do a better job. The 1000 gal water supply is sufficient, when using the 10/16 in. orifice, for a full day's operation. With the 16/64 in. orifice, one refilling is required.

Serve Growing Load With Pole-Top Substation



ADDITIONAL CAPACITY to serve an expanding residential area was provided in three weeks with transformers and regulators mounted on racks

Use of a new type of pole-top substation permitted Los Angeles Dept of Water and Power to add 450 kw of transformer capacity at an estimated

(*Continued on page* 168)

Built to serve the serviceman!

Ask a serviceman what he likes best about his International Truck. You'll get many answers.

Some will tell you Internationals are always dependable, always get there. Others will mention comfort of the cab or handling ease. Still others go for the service-utility bodies that bring a whole workshop to the job.

Whatever their reasons may be, they all agree that these great trucks are engineered to make the serviceman's job easier, more efficient. To put one on your job, see the nearest International Dealer or Branch soon.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

Look at these features:

- Silver Diamond valve-in-head truck engines are rugged, packed with extra power. Engineered to save you plenty on operating and maintenance costs.
- New green-tinted, non-glare safety glass available in the Comfo-Vision Cab. One-piece full-vision windshield.
- Super-steering—more positive control. Wider front axles make possible full 37° turning angle for easier handling and maneuverability.
- Wide variety of light-duty models—½, ¾, and 1-ton sizes—GVW's from 4,200 to 8,600 lbs. 115, 127, 134-in. wheelbases. Pickup, panel, stake, and many other types of bodies.

International Harvester Builds McCormick Farm Equipment and Farmall Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

Better roads mean a better America

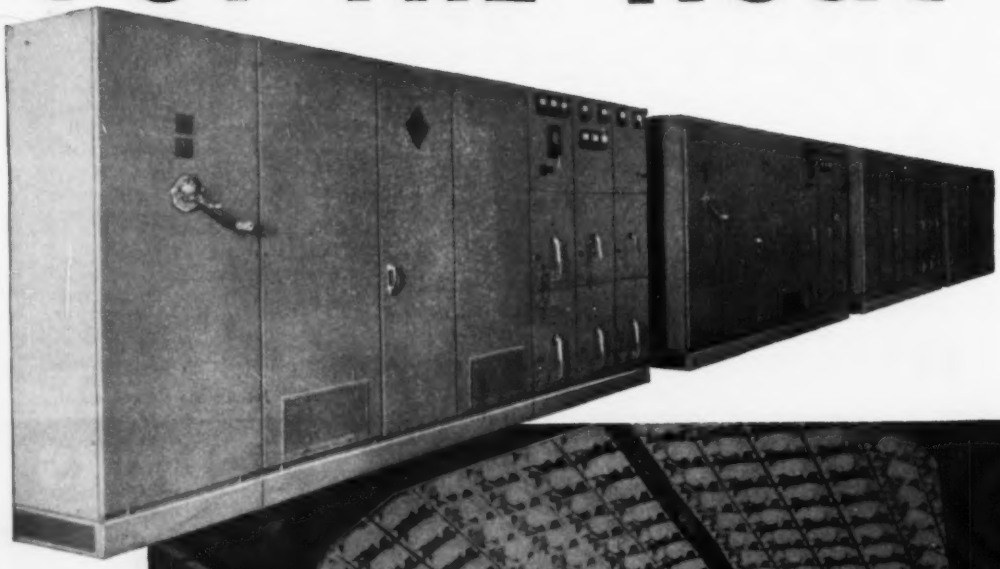
INTERNATIONAL TRUCKS

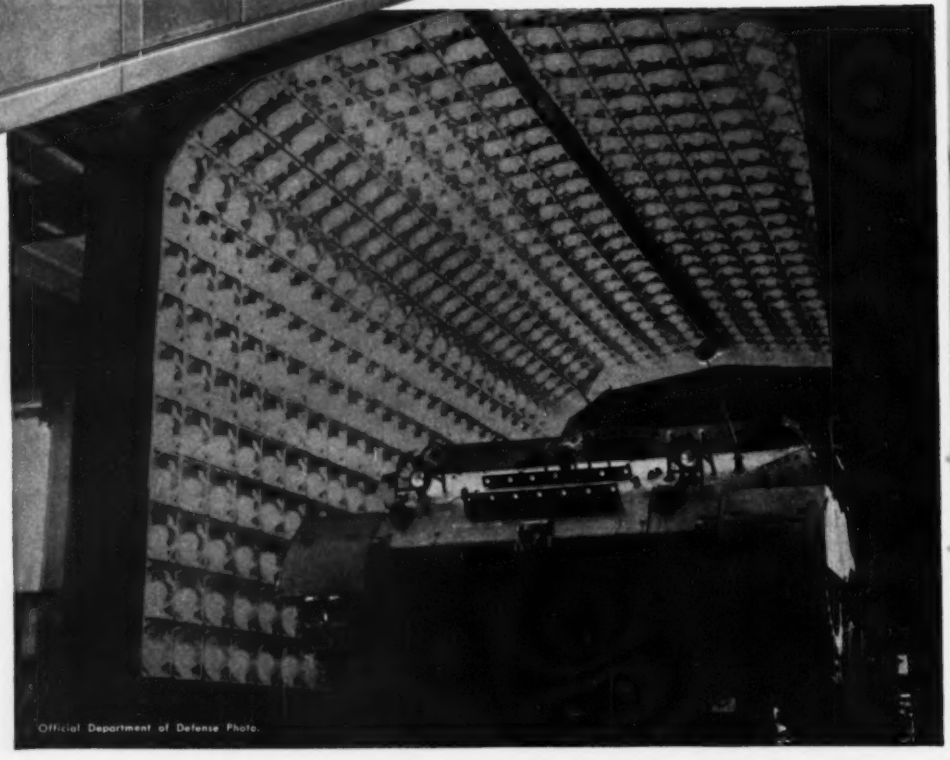
"Standard of the Highway"

International L-110 and L-120 series, 115 and 127-in. wheelbases, available with special service-utility bodies.

ALLIS-CHALMERS

PUT THE "Heat"





Official Department of Defense Photo.

UNIT SUBSTATIONS

ON PRODUCTION!

YOU CAN INCREASE the production of your plant without adding production equipment or hiring more help . . . just eliminate undervoltage. Motors, lights, heating units—all electrical equipment gives top performance only when operated at full voltage.

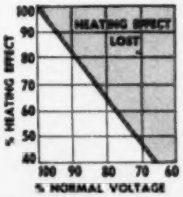
Paint baking or drying operations take longer when voltage drops. For example, a 10% drop reduces heating effect of infra-red lamps 19% . . . slows production. One paint drying operation required 63% more time when voltage dropped 10%.

A major cause of undervoltage is long, heavily loaded 480 volt feeders. Install Allis-Chalmers LCS Unit Substations at load centers and eliminate excessive line drop by shortening low voltage cables. Performance of all electrical equipment will improve . . . and personnel efficiency will increase because of better illumination from existing lighting fixtures.

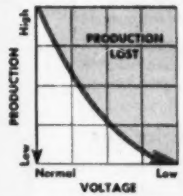
You can count on the cooperation of experienced Allis-Chalmers substation engineers in working out your distribution system. Allis-Chalmers LCS Load Center Unit Substations are neat, compact, easy to install and provide protection to personnel. Get in touch with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3272

LCS Unit Substations

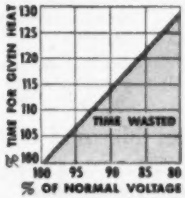
HOW UNDERVOLTAGE WASTES MANHOURS . . . CUTS PRODUCTION



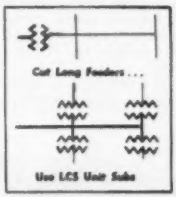
FULL OUTPUT from existing equipment demands full voltage. Heat output of infra-red lamps (used for baking paint on metal, drying coils of electrical apparatus and similar applications) drops with undervoltage. Output of resistance furnaces also drops off as the square of undervoltage.



PRODUCTION LOSSES RESULT from undervoltage. In one case a 10% drop in voltage cut the output of an infra-red drying oven from 1500 pounds per hour to 1275. Undervoltage means less work done each day . . . greater overhead for the work done, more manhours to be figured into every job.



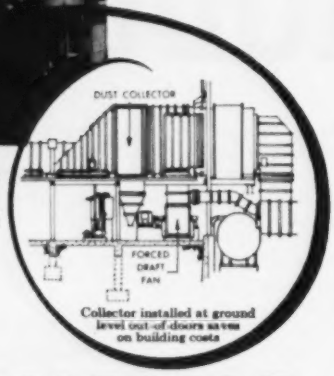
TIME IS WASTED when undervoltage is distributed to infra-red bulbs and other heating devices. It takes longer to deliver the same amount of heat . . . longer to do a given job. In one plant, drying time for black painted sheet steel increased from 11 to 18 minutes by a 10% drop in voltage.



A MAJOR CAUSE OF UNDERVOLTAGE is voltage drop in secondary feeders. Long low voltage lines may prove inadequate as production schedules are stepped-up and new machines added. Install substations at load centers to cut feeder length, reduce voltage drop and increase production.

ALLIS-CHALMERS

Titus Station
Metropolitan Edison Co,
Reading, Pa.



Collector installed at ground level out-of-doors saves on building costs

Answer *your* specific dust control problems with an

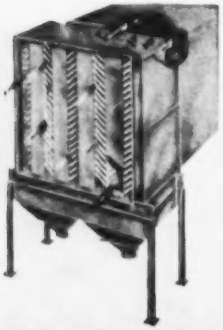
AEROTEC

DUST COLLECTOR
exactly tailored to your needs

Here is one of the many instances in which the Aerotec Design 3 RAS Dust Collector proved its high efficiency so conclusively that Metropolitan Edison purchased a third unit. Gilbert Associates Inc., of Reading, Pa., were designers and constructors. Three bituminous coal-fired steam generators at this modern power plant, will be equipped with Aerotec Collectors. Layout and breeching are so designed that an Aerotec electrical secondary can be added at a future date without loss of the initial investment.

This mechanical collector, with its multiple, small-diameter tubes, offers you the advantages of high dust recovery in the ultra-fine ranges, even at partial load. The tubes are permanent mold aluminum castings of absolute uniformity. This construction provides the smooth inner wall necessary to ultra-fine dust collection. Tubes are assembled at the factory in lightweight "building block" sections. These assemblies permit flexible arrangement to suit your needs, with the economy of standard construction.

Let our engineers bring to your problems the benefits of their long experience in the field of flyash collection. No obligation.



Typical Inlet and Outlet Variations

Catalog 601 gives you complete details on standard and special Aerotec arrangements, plus other useful data on dust collection. Call or write for your copy today.

Project Engineers
THE THERMIX CORPORATION
GREENWICH, CONN.
(Offices in 38 Principal Cities)
Canadian Affiliates: T. C. CHOWN, LTD.
1440 St. Catherine St., W., Montreal 25, Quebec • 983 Bay St., Toronto 5, Ontario

THE AEROTEC CORPORATION
GREENWICH, CONN.

Pole Top Substation

(*Continued from page* 164)

cost of only $47.33 per kw and in three weeks time. This amount includes erection of the new 750-kw station and removal of the old 300-kw pole-top installation.

Additional transformer capacity was needed in an area characterized by large residential tract developments. But location of the substation was complicated by the uncertainty of just where the load center will be in the future because of rapid development in the area. Therefore a somewhat temporary and low-cost installation was desired.

New substation has three 250-kw transformers on one rack and voltage regulators on an adjacent rack. Primary feed for the installation is from the Van Nuys-Palisades 34.5-kv line through pole-top switches. An alternate feed from the Sawtelle-Palisades line may be had through another set of pole-top switches. Estimated cost of the total operation was $21,309.

Light-weight Tool Aids Cable Pulling

Improved techniques for pulling cable up the inside of street light poles have been developed by Toledo Edison Co. Walter Schmidt developed the new tool which is demonstrated here by Nolan Pitney, a welder in the underground department.

The device includes a pulley which fits on the top of the street lighting standard and weighs only eight pounds. A similar device in use in the past weighed 24 pounds.

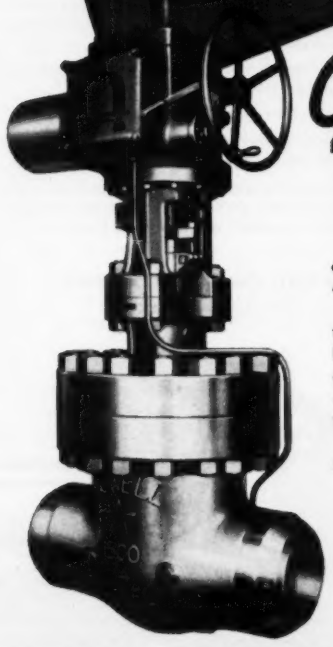
SAFE

SURE

FAST

EASY

VALVE OPERATION



Get all 4 with LIMITORQUE

For remote or local control . . . positive, speedy, safe, dependable opening and closing of all types of valves up to 120" diameter . . . equip with Limitorque. *Just pushing a button sets them in operation.*

They provide complete safety in two ways: First, they protect the workmen by eliminating the need of climbing to high or hazardous locations for manual valve operation. Second, they protect the valve operating parts by assuring a tight valve closure without overload on disc, seating rings or valve stems . . . and by automatically shutting-off the motor if foreign obstructions are met during the closing cycle.

Limitorque is actuated by any available power source . . . electricity, air, water, gas or oil.

Your valve maker can supply Limitorque Controls.

For complete details about Limitorque, send for Catalog L-50.

Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

"For the Record"

PENTA* has a superior performance record in the protecting of wood from termites and rot.

PENTA is a widely accepted wood preservative and is a standard of the American Wood Preservers Association.

PENTAchlorophenol is a chemical of constant, uniform effectiveness.

PENTA is clean . . . poles are easy to handle.

PENTA is available—over 60 commercial treating plants can supply clean crossarms and poles.

A technical representative, experienced in wood preserving problems, is available to help you make all wood structures last longer.

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

The Dow Chemical Company
Dept. PE 11A, Midland, Michigan

- ☐ Send me free booklet "Pointers on Penta".
- ☐ Send me list of Penta treating plants.
- ☐ Please have technical representative call.

Name _____ Title _____

Company _____

Address _____

City _____ State _____

DOW
Penta
chlorophenol

SOUND OF A WATCH is amplified about 10,000 times during spectacular "Partners in Progress" first part of the show, which begins with discharge of 6 million volts across electrodes bracketing Edison picture

CERTIFIED STUDY LAMP undergoes careful scrutiny during playlet which is second portion of the presentation. Advantages of valance lighting and other and dramatic lighting effects are demonstrated

Promote Lighting With Spectacle and Story

Electricity, especially in the form of light, is the key to better living. This is the theme of a new promotional show, "The Magic Key," developed by Public Service Co of Colorado, Denver. The show is presented in two parts, the first tracing the progress of the electrical industry and the community. The second illustrates how better living may be had through improved residential lighting. The entire show was previewed during the 49th annual convention of the Rocky Mountain Electrical League at Glenwood Springs, Colo.

The first portion, "Partners in Progress", is the more spectacular of the two. It begins with a discharge of a 6-million-v arc across a dark stage, followed by such acts as lighting fluorescent tubes with this high voltage and lighting a cigarette through a cake of ice charged with a million volts. Other acts include frying an egg on a metal disk suspended magnetically over a table and turning on and off the house lights by breaking a beam of light shining on a photoelectric cell. At one point an unseen voice pays tribute to Thomas Edison while a picture of the inventor is illuminated on an otherwise dark stage.

The second part of the show tells the home lighting story in playlet form. It includes demonstrations of various lighting recipes designed to produce better seeing and more comfortable living in the home. Advantages of certified lamps, valance lighting and other modern and dramatic uses of light are clearly brought out.

LIGHTING SHOW tying light and better living together is advertised by this card

"The Magic Key" presentation was originated and developed by G. S. Buck, vice president and general commercial manager of Public Service. The entire cast is comprised of company employees. The show is designed for presentation before various customer groups, including women's clubs, luncheon groups, the PTA and others.

The first part of the show was the feature attraction during the observance of "Production for Freedom" week in Denver. Before going on the road for presentation throughout the entire company service area, it will be shown initially around Denver. The home lighting playlet will become part of the company's Electric Institute show presented five afternoons a week in the auditorium of the main office.

Promotional Package Prepared by NAWB

A promotional package aimed at capturing what it estimates is a 20-million customer market for modern home wiring has been prepared by the National Adequate Wiring Bureau. Included is a campaign plan book, two new direct mail folders, 18 small space ads in mat form for electrical contractor use, and layout and cutout sheets for use in making proposals to customers, plus other available folders and booklets.

The 16-page plan book, entitled "Let's Sell Wiring to Our Biggest Market," gives case histories of three successful rewiring campaigns being conducted currently, plus many practical ideas for various industry groups to follow in launching a program.

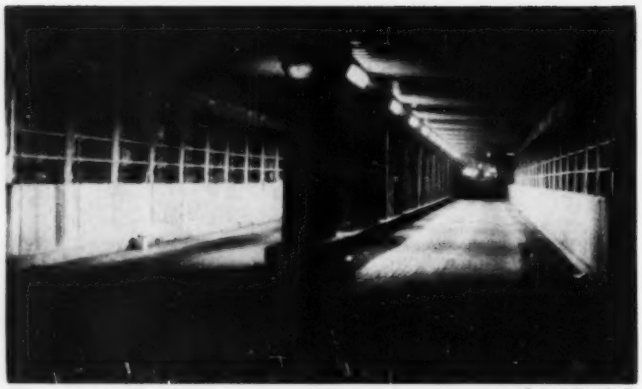
One of the folders, "Spend Less Time in Your Kitchen and Laundry," points out how, with out-of-date wiring, electric facilities perform less efficiently. The other folder, "Get Rid of This—and Plug in Better Living," shows a prospect that a home cannot

run smoothly and efficiently if he risks a "blackout" whenever he uses all the lights and appliances he needs.

The campaign kit can be obtained by writing the NAWB at 155 E. 44th St., New York 17, N. Y.

Con Ed Promotes Blankets With Aid of Manufacturers

Consolidated Edison has joined with five manufacturers in an electric blanket compaign in metropolitan New York. The utility is devoting a bill enclosure to its 2,700,000 customers, posters on its truck fleet, billboards, window and showroom displays, spots on its two television programs, and a part of its current newspaper advertising program. The manufacturers—General Electric, Westinghouse, Tropic-Aire, Universal, and Proctor—are spending about $100,000 in various local media.



General Electric Co

Fluorescent Lighting Brightens Underpass

One of the first underpasses in the country to use fluorescent street lighting is Osage underpass in Fort Wayne, Ind. The installation, consisting of 20 8-ft fixtures, provides an illumination of 2.5 foot candles, according to J. H. Hinman, chief electrical engineer of Fort Wayne Municipal Utilities. On an equivalent capital investment, he said, the new lights nearly double light intensity, and materially reduce maintenance costs and power consumption.

Modern Living Exposition Set for Chicago, Mar. 21-29

Chicago Electric Association has announced that it will cooperate with the Metropolitan Home Builders' Association for the third consecutive year in staging the 1953 Modern Living Exposition to be held at Navy Pier, March 21-29.

It is predicted that the 1953 event will be better and more successful than past expositions because arrangements have been made to have all electrical exhibits in one section of the Pier. Last year's show drew paid admissions of more than 100,000 homemakers, all prospective purchasers of electrical appliances.

Employee Purchase Plan

A month-long employee purchase plan which has enabled its workers to buy major electric appliances at substantial savings has been completed by Jersey Central Power & Light Co. Leading manufacturers and dealers in the service area cooperated.

Fluorescent Street Lighting Serves Patchogue Utility

W. S. OXLEY, Manager, Engineering and Construction, Patchogue, N Y, Electric Light Co

Modern fluorescent street lighting was installed recently by the Patchogue Electric Light Co to illuminate a side road along its property, as well as the grounds and front of the company garage. Temperatures as low as 10F had no effect on operation of the lamps and accessories.

Lighting units are V-shaped fixtures mounted horizontally and at a height 27 ft above road surface. Each fixture has four 96-in., T-12, 600-ma. warm white fluorescent lamps. Each pair of lamps is connected through one ballast and to a 6.6 amp series circuit. Four lamps and two ballasts consume 625 w and are practically instant starting. Total of light furnished by each set of four lamps is approximately 23,000 lumens.

STREET LIGHTING UNITS with fluorescent lamps illuminate Pelco's property. They operated satisfactorily in temperatures as low as 10F

FARGO

HOT LINE CLAMPS for Aluminum, Copper or Any Combination

Built with a Heavy-Duty Spring

to Assure Constant Pressure on the Wire

Fargo "A-G-E Series" Hot Line Clamps are available in 3 sizes—with a heavy-duty spring made of Vanadium steel, stress-relief annealed after plating to insure permanent spring strength.

Mark well the many advantages which this heavy-duty spring provides in Fargo's "A-G-E Series" Hot Line Clamps. To begin with, it makes-up for the variables caused by fault currents . . . atmospheric changes . . . load variations—and the tendency of a conductor to "relax" or "flow" while under stress. Also, it makes the Clamps vibration proof.

You'll discover, too, the advantage of a new Fargo lock that prevents separation of male and female components —and that the lubricated bolt thread is completely housed to avoid freezing and corrosion. Clamps have a V-jaw which provides 4 points of contact. They are light in weight and can be easily and quickly installed at the end of a stick.

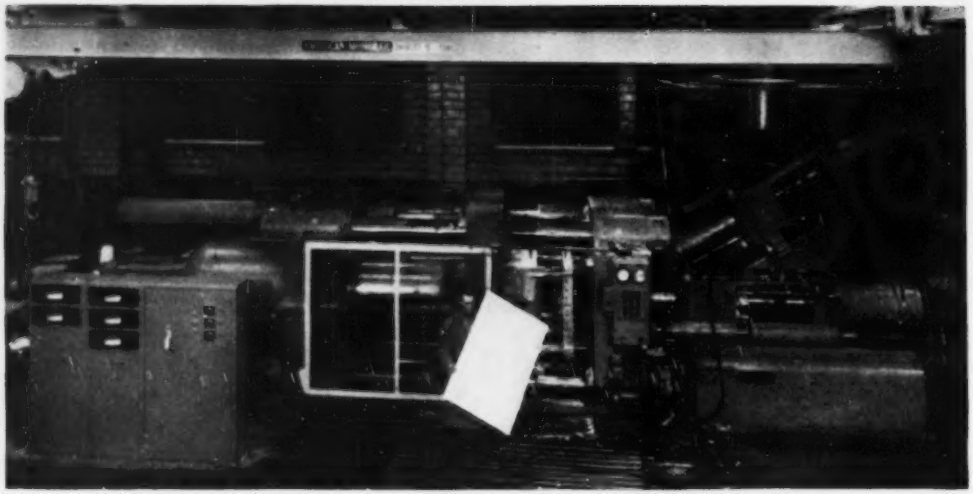
•

Ask your Line Material Field Engineer to give you complete details.

FARGO

LM®

INDUSTRIAL APPLICATIONS



Large Thermoplastic Press Uses Electric Heat

Thermoplastic injection press turns out large refrigerator innerdoor liners, claimed to be world's largest molded thermoplastic piece, at Amos Molded Plastics, Edinburg, Ind.

Pre-plasticizing cylinder is heated with 38,960-w strip heaters. Shooting cylinder has 16,000-w of strip heaters. Temperature of molds is automatically controlled. Press is operated by 75-hp motor driving oil gear hydraulic pump, exerting 3100 psi, or 1500 tons clamping pressure to mold surface. Holding pump has 15-hp motor.

Group vs Spot Lamp Replacement Saves 100%

Sylvania Electric Products Inc

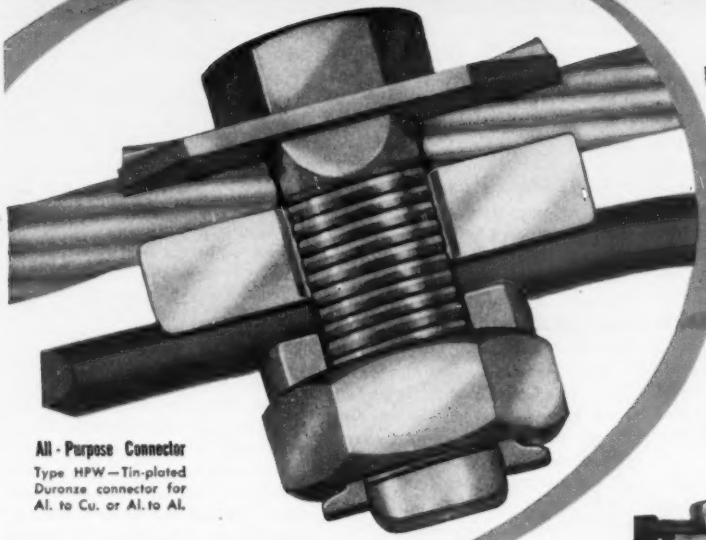
GROUP LAMP replacement program changed 43,000 fluorescent lamps and cleaned all fixtures. Saving of 100% was effected over spot replacement. Maintenance calls for lamp outages have decreased 92% and staff of two can handle daily needs

Claimed to be the largest group lamp replacement program ever executed, 43,000 fluorescent tubes were replaced in 21,000 fixtures in the 36-floor John Hancock Mutual Life Insurance Co building, Boston, Mass. An outside contractor did the job.

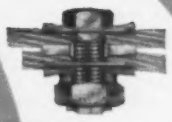
Company officials are delighted with the results of the group replacement program and figure a 100% saving over spot replacement. For efficient lighting, all fixtures require washing at periodic intervals. Since lamps would have to be removed during the normal washing operation, it costs nothing to replace the old lamps with new. A 76% saving was effected by contracting for group replacement from an outside firm. The saving is made by reducing the permanent lamp maintenance staff to a minimum. Two men now keep up with spot replacements necessary between group replacements and maintenance calls for lamp outages decreased 92%.

After the building was completed

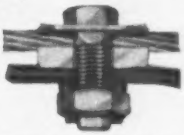
Aluminum Connection Problems?
Use These BLACKBURN FITTINGS!



All-Purpose Connector
Type HPW—Tin-plated Duronze connector for Al. to Cu. or Al. to Al.

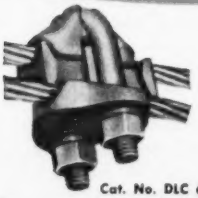


Type AAW — For Al. to Al. — All-aluminum connector with 2 bell-mouthed washers and aluminum contour spacer to hold wires in shape.

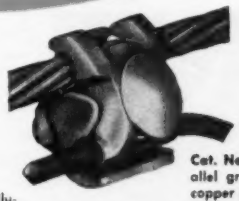


Type CA — For Al. to Cu. — Aluminum bolt and nut, one bell-mouthed washer and one tin-plated contour spacer washer.

Type H-3-W — Primarily for 4, 6 and 2 Al. tap to Cu. line. Duronze connector with tin-plated bolt and 2 grooved bi-metallic washers.



Cat. No. DLC 6-0 — Aluminum dead end loop clamp, covers wire range 6—1/0 ACSR.



Cat. No. PAC 6-0 — Parallel groove clamp with copper liners soldered to aluminum body on one side. Also made for Al. to Al. and for armor rod.

ALL BLACKBURN Connectors and Clamps for Aluminum conductor are designed to protect the conductor against crushing as well as against electrolysis. Yet these same fittings have extra gripping ability to produce a tighter and better connection, to give you years of trouble-free service. They are all made of high-strength alloys for extra strength to maintain their tightness through the years.

JASPER BLACKBURN CORPORATION
85 MADISON STREET • ST. LOUIS 6, MISSOURI
Phone Central 3007

Always specify BLACKBURN Hi-Strength Connectors & Fittings They'll Give You Years of Trouble-Free Service . . . Send for Samples Today

BLACKBURN *Hi-Strength* CONNECTORS

and occupied, housing and maintenance officials discovered the need for at least six full-time electricians to replace lamp burnouts on a one-at-a-time basis. When burnouts on some floors ran between 30% and 50%, they exceeded the maintenance department's ability to replace them without adding personnel.

The hit or miss method of replacement was costing about 83¢ per lamp (not counting overhead) and tying up several electricians. Dirt accumulation on the fixtures had reduced light output by as much as 35%.

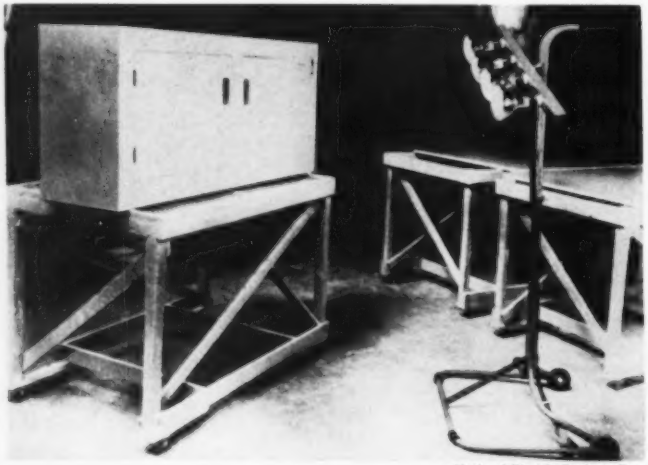
A study showed conclusively that engagement of an outside contractor would be the most economical method to undertake the lamp replacement program. A contract was signed with a large cleaning company in Boston to "take down and wash all louvers, remove fluorescent tubes, wash all reflectors, reassemble the fixtures using new tubes, and leave all fixtures in an operating condition unless the trouble was electrical." The contract included all costs of supplies, insurance, and other overhead, and was based on a unit price.

The contract was completed in 45 days, and elapsed time indicators and meters were installed on three floors to record the total burning hours and number of starts.

When elapsed time indicators recently showed lamps reaching 5,500 burning hours, another contract was let with the same cleaning company. The contractor's method of cleaning fixtures was determined by time and motion studies made by maintenance personnel. Twenty-two men worked for the contractor, including one supervisor. Two men stay in the louver-washing room in the sub-basement. The crews used four rolling stages, each stage bridging two rows of lamps. There were two men on a staging and one man on the floor feeding to the stages.

Three stages start at one end of the floor and proceed to cover six rows of fixtures. The fourth stage would take the rest rooms, private offices, and stairways, and then join the other three continuing with them until the floor was completed.

The feeders supply the men on the stage with clean louvers, lamps, and clean water. They remove the dirty louvers and lamps, remove the lamp jackets, take care of cartons, and rearrange furniture. The four washing crews average 450 units washed and relamped on each 8-hr shift.



National Electric Products Corp

Portable Unit Speeds Paint Drying

Paint and lacquer drying is speeded with a new portable infrared lamp unit at the studio of Gardner-Robinson-Stierheim & Weis, Inc, Pittsburgh, makers of industrial displays. The portable unit can be wheeled in and around displays —not always possible with a fixed drying unit. It has four 250-w infrared lamps.

INDUSTRIAL BRIEFS

Mold embossing of vinyl plastic with a recently installed electric heater at the Lion Leather & Plastic Co, Beverly, Mass., has the following advantages over the previous method employing steam generated from a large heating boiler. Constant controlled temperature, rejects at a minimum, increased output due to controlled higher operating temperatures, better quality product commands higher price on market, equipment requires smaller space, cooler ambient temperature with improved working conditions for employees, cost of product less than under previous method. Equipment operates approximately 200 hr monthly. Heater is 40-kw, 3-phase, 220-v. J. R. McVey, Salem Electric Lighting Co, Salem, Mass.

Paint drying in an infrared tunnel at the Larson Tool & Stamping Co, Attleboro, Mass., has resulted in a superior product, both in hardness of finish and appearance, with less rejects and greater output. Air dry finish on an automobile jack had created a production bottleneck which was easily overcome by the installation of the infrared tunnel having 216-375-w lamps in gold-plated reflectors. This 81-kw tunnel is conveyorized in unison with the paint spraying and turns out 1200 finished jacks in a 9-hr day. George B. Newton, Power Sales Engineer, Attleboro Steam & Electric Co.

Drying glue when glueing formica to plywood panels for cabinet and table tops is done 24 times as fast as the old air drying method by the use of electrically-heated rubber blankets at the Bay View Linoleum Co., Milwaukee. Three blankets are used—each measuring 149 in. by 39½ in. Each has a total of 550 w at 240 v. A percentage timer is used to control the temperature at 160 F. At this temperature the glue requires 20 min to cure compared to 8 hr with the air drying method, thus greatly increasing production, cutting cost, and reducing required floor space as well as getting a much better product. The installation has been in service over 2 yr with no maintenance. A. F. Falk, Industrial Heating Engineer, Wisconsin Electric Power Co, Milwaukee, Wisconsin.

NOW...THERE'S AN O-B CLAMPTOP

- for any voltage 22 to 69 kv
- for conductor ¼ inch to 1½ inch
- for pintype or line post

Now you can have the modern successor to the tie wire—the O-B Clamptop—for any voltage from 22 to 69 kv, and any size conductor cable from 0.25 to 1.50-inch, either in the conventional pintype design or the line post. Voltage, conductor diameter, or insulator style, are all now fully accommodated in the Clamptop category.

With Clamptops, loose connections at the insulator head, slipping conductors and strand chafing are ended. A man without special skill, using a common hand wrench, can make up the "tie" in considerably less than a minute, and make it better, stronger, and more lasting than the best-installed long-wire hand tie. If lines must be worked with hot tools, the Clamptop is outstanding in its simplicity, speed of handling, and much greater safety.

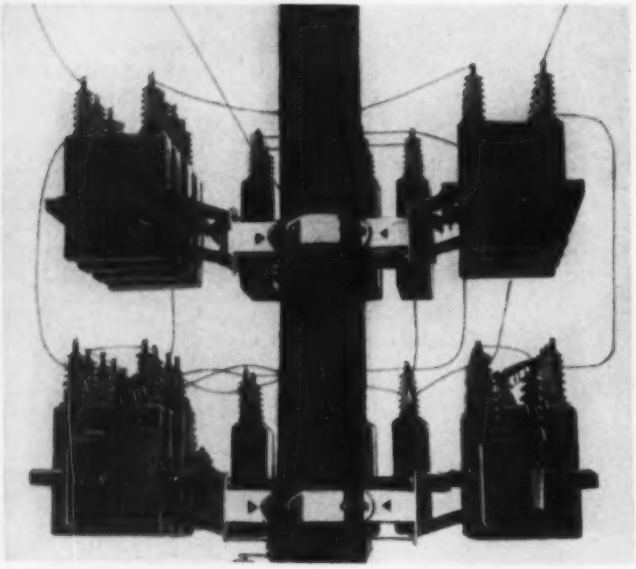
If you feel that the established pintype insulator design--regular or post--can't be improved upon, you haven't investigated the Clamptop. It's simple to handle, saves valuable time, and produces a better job at each point of support--and it is now available for free choice in the complete 22–69-kv range. By substituting a secure clamped connection for an insecure tie wire, you gain a long list of practical advantages. Specify O-B Clamptops on your next line project and see for yourself.

Ohio Brass

MANSFIELD OHIO, U.S.A.

4231-H

NEW EQUIPMENT



Pole Bracket

For capacitor or transformer mounting, for pole diameters 6 to 10½ in. and 9½ to 14 in. All parts are hot dipped galvanized according to ASTM Spec A-123.

Poles do not have to be drilled for mounting, no maintenance required. Will accommodate any EEI-NEWA standard support by spacing up to and including 100-kva transformers.

Universal Pole Bracket Corp, Houston, Texas

High Voltage Fuse Panel

For gang-operated disconnect. Fuse compartment has disconnecting blades which are disconnected automatically when the compartment door is opened, so operator can replace separate de-energized fuses without using a hook stick.

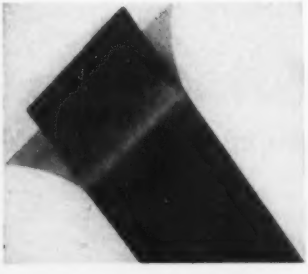
Mechanical and electrical interlocks prevent fuses being disconnected when switch is closed, prevent closing motor switch with door open. Target indicators on door tell whether motor switch is opened or closed, fuse panel is connected or disconnected.

Electric Machinery Mfg Co, Minneapolis 13, Minn.

Heavy-Duty Switch

For 600v ac or dc, metal enclosed. Dis-ruptor combines functions of disconnect and load interruptor. It has an arc-interruptor chamber and a quick-break mechanism, can be used for opening motor circuits, for main entrance or branch feeder control, as a disconnect for transformers, capacitors, furnaces, etc. Two-pole and three-pole units are available in 400, 600, 1,200, 2,000 and 3,000-amp sizes.

Delta-Star Electric Co, Chicago 12, Ill.



Composite Insulation

Called Aboglas, rated class B, consists of a layer of varnish-saturated asbestos paper bonded between two layers of varnished open-weave Fiberglass. For use in heavy duty equipment subject to abuse and overloads. Aboglas is less expensive than other Class B insulations. Available 0.029 and 0.050 in. thick.

Natvar Corp, Woodbridge, N. J.

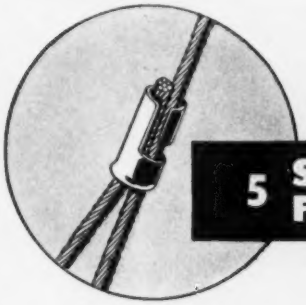
R-F Induction Generator

Rated at 25 kw continuous duty at 450 kc in accordance with NEMA standards. Tank circuit has high kva rating, taps on plate transformer provide power output control. For use on relatively long production runs where readjustment is infrequent. Deluxe model uses saturable reactors for stepless power control. Filament voltage is controlled ± 3% to prolong tube life. Closed-circuit distilled water cooling circuit, with water-to-water heat exchanger.

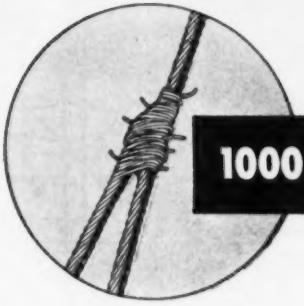
Westinghouse Electric Corp, Pittsburgh 30, Pa.

(*Continued on page* 182)

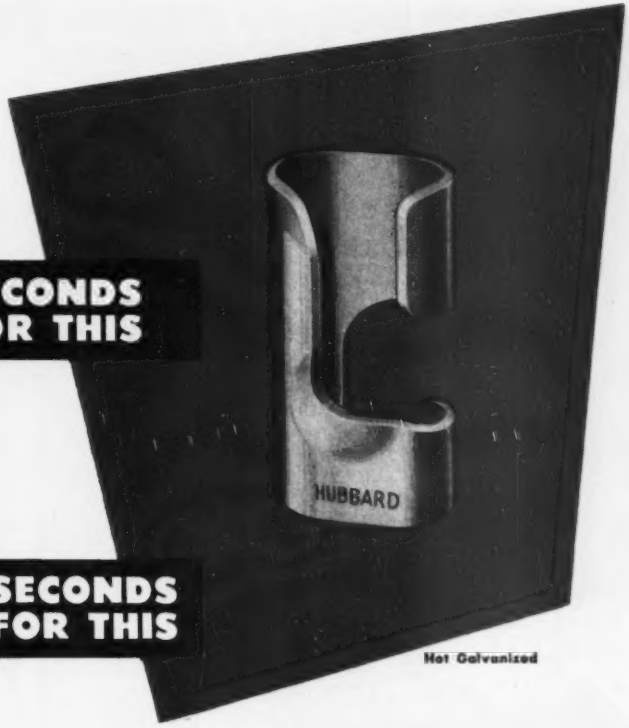
WHICH?



5 SECONDS FOR THIS



1000 SECONDS FOR THIS



Hot Galvanized

Write

FOR THESE SAMPLES...

or, look in your next shipment of Hubbard Guy Clamps for an envelope containing several ServiSleev samples. Try them . . . see how perfectly simple and simply perfect they are.

SERVISLEEVS

Make the Difference!

The cost of servicing a guy wire by wire wrapping is many times the cost of a ServiSleev . . . and the result is an awkward, bungling, unsightly job, dangerous to the lineman while installing, and forever afterwards.

ServiSleevs are applied in less time than it will take you to read the next sentence. Slip the ServiSleev over the guy wire, belled end toward the clamp; tap it with a wrench or pliers, and you have a neat, safe, and permanent installation.

Millions of ServiSleevs are in use throughout the world. They have made the wrapping of loose guy wire ends as obsolete as surreys and high button shoes.

HUBBARD AND COMPANY

ESTABLISHED 1845

PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA

"Hang the Load on Hubbard Hardware!"

Teamwork of an electric utility's power sales engineer and a G-E Wire and Cable specialist achieves substantial savings for an Eastern manufacturing plant. The installation of an interlocked armor cable system resulted in a lower installed cost than other methods which had been considered. And continuing savings in yearly power costs will be realized.

G-E specialists help power sales engineers keep their customers up to date on

New wire and cable practices

Giving electric utility power sales engineers the latest information about developments at General Electric is a most important job of our wire and cable specialists. As a result, utility power sales engineers can more quickly offer their customers the benefits of important progress in research, improved installation techniques, and the latest developments in wire and cable.

For example: At a meeting in an Eastern electric utility the G-E wire and cable specialist demonstrated how interlocked armor cable makes possible substantial savings in installation costs and materials. Sometime later one of the utility's sales engineers was asked about the modernization of a factory distribution system. The job seemed to require a cable application similar to that discussed at the meeting.

Then, the utility power sales engineer called in the G-E wire and cable specialist for additional installation information and application data. Together with the plant engineer, the utility engineer and the G-E specialist laid out a new interlocked armor cable system that met present and projected power requirements. After conferences with the city inspector and the fire underwriters, the plan was submitted to the plant's management for approval.

The management of the plant—and of the utility—are particularly pleased with the new system. Reduction in the number of metering points will result in a substantial yearly savings for the customer. Most important, the installed cost of the interlocked armor cable system is far below all previous estimates for other types of distribution considered.

Important progress is being made every day at General Electric. To keep in touch with this progress, talk frequently with our Wire and Cable specialists. They want to help you. Call them in whenever you have a question on wire or cable. Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

G-E Wire and Cable specialists are always anxious to keep utility power sales engineers abreast of new wire and cable developments.

You can put your confidence in—

GENERAL ELECTRIC

The Old Reliable

EVERSTICK ANCHORS...

EXTRA Holding Power

QUICKLY Installed

TOUGH For long life

● They speed up work and provide dependable anchorage in new construction and maintenance. Quick and easy to install—made of tough rust-resistant malleable iron—their holding power "tops" all others. Available two-way, three-way, four-way, and cone types. Write for facts.

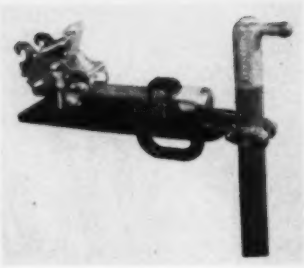
AN EXCLUSIVE
EVERSTICK
FEATURE
Exclusive Everstick nut housing. Locks anchor firmly on rod. No chance of rod slipping thru anchor.

EVERSTICK ANCHOR CO.

Manufacturer of "THE ANCHOR OF MERIT"

FAIRFIELD, IOWA

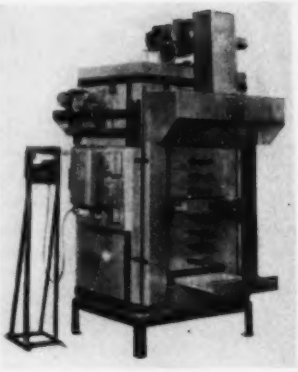
Switchstick Attachment



Said to permit easy switchstick operation of cutouts, including removing and replacing cutout doors, the stainless steel fitting clamps to the head of any standard switchstick. The attachment folds back to assure no interference with ordinary switchstick usage.

General Electric Co, Schenectady 5, N. Y.

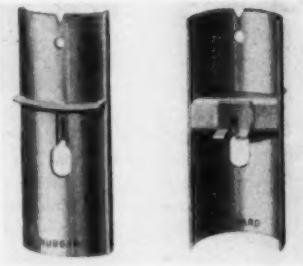
Drawer-Loaded Oven



Electrically heated for sintering fluoro-carbons at temperatures to 750 F. Drawers have insulated fronts, ball-bearing rollers in internal guides. A millivoltmeter pyrometer controller with four-way plug polarized receptacle makes instrument connection easy. Control equipment is electrically interlocked, an excess temperature cut-out is provided. Working space: 10 drawers 20 in. wide, 14 in. deep, 3 in. high.

Lydon Brothers Inc, Hackensack, N. J.

Anchor Plate



Formed from 3/16-in. steel plate with turned edges and reinforcing sections welded to the plate. "Fin" of ¼-in. steel adds strength and prevents anchor from riding up when the anchor rod is pulled into place. Assembly is double-dip hot galvanized.

Hubbard and Co, Pittsburgh, Pa.

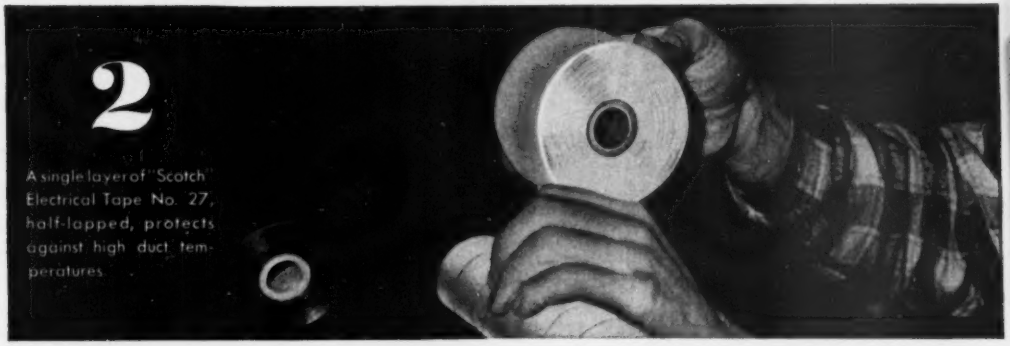
Fan-Cooled Motors

With 2-1, 3-1, 4-1 speed variations, 20 to 25 hp totally enclosed. Large internal fan circulates air between motor housing and stator, over motor windings, and through openings in rotor.

Sterling Electric Motors Inc, Los Angeles 22, Calif.

1
Three layers of "Scotch" Electrical Tape No. 22, half-lapped, form tough foundation layer on 2,000,000 CM cable.
SCOTCH
Electrical Tape

TAPE takes over when insulation fails...



and saves huge cables from scrap heap!

WHEN HIGH OPERATING heat caused insulation failure on 2,000,000 CM cables, this large western public utility turned to tape—"Scotch" Electrical Tape—to solve the problem.

And they found just what they wanted: first, a tough, flexible tape for a first wrap; next, a glass-cloth tape with thermosetting adhesive for high heat resistance; then, an extra-heavy plastic tape to protect the cables from mechanical damage. Together, these three tapes saved the company hundreds of dollars in replacement costs.

"Scotch" Electrical Tapes may be the answer to one of *your* insulating problems, too. Write today outlining your requirements. No charge or obligation, of course.

SCOTCH BRAND ELECTRICAL TAPES

3M

The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive adhesive tapes made in U.S.A. by **Minnesota Mining & Mfg. Co., St. Paul 6, Minn.**—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N.Y. In Canada: London, Ont., Can.

This book answers your questions about Microwave Communications Systems

Have you been wondering whether a Microwave System is the answer to your communications problem? Then you should write, wire or phone for a copy of this brand-new RCA manual. It's free to executives of utilities, pipelines, railroads and other right-of-way companies.

It tells how many companies with far-flung operations and need for "along-the-way" communications are already using microwave. How these companies have found it the most economical type of communications system (channel-for-channel). How in direct day-by-day comparisons they have found it the most reliable of all systems. And it tells how you can go about planning a system that will fit your needs.

RCA
MICROWAVE COMMUNICATIONS SECTION
RADIO CORPORATION of AMERICA
ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

In Canada: RCA VICTOR Company Limited, Montreal

Don't Delay—WRITE TODAY!

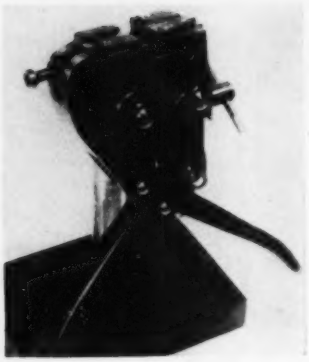
RCA Engineering Products, Dpt. 45 KD, Camden, N. J.
Please send me your new, free booklet *Introduction to Microwave.*

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____



Cold-Welding Tool

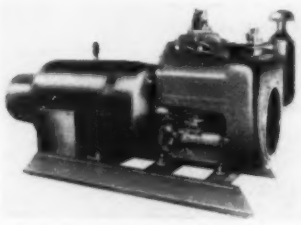
For butt welding and lap welding aluminum to aluminum, aluminum to copper, with no heat or chemicals. Weld is stronger than wire or sheet, operation is quick and requires no special skill. Tool is based on pliers principle, is compact and portable. Sizes for larger and smaller welds are in process.

Utica Drop Forge & Tool Corp, Utica, N. Y.

Meter Movement

Built as removable and replaceable cartridge. Movable coil is suspended on twin wires, with no friction from pivot bearings. Momentary overload factor of 1,000 times for light pointer type, 100 time for mechanical pointer type. Meters can be had in sensitivities from 1 microamp full scale and up. Accuracy is claimed ½ % even after long usage. Meters are dc type but can be applied to ac with suitable rectifying means.

Columbus Products Corp, Yonkers, N. Y.



Stand-by Power Plant

Primarily for emergency service, this model has a 10-kw capacity. It

(*Continued on page* 188)

Low-cost accuracy; neat and easy to install!

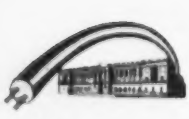
Low installation costs and strict accuracy have been linked together in Westinghouse Instrument Transformers for years. Basic construction features like top-mounted HV bushings simplify connections . . . make neat installations. Here, time and effort are saved by bolting the Current Transformers to the middle cross-arm and the Potential Transformers to the lower. Wiring is practically straight through. In addition, design features, like vacuum plastic impregnation, eliminate maintenance problems. The Midwestern utility using these transformers bought them on the basis of *low initial cost* and *ease of installation*. Its Meter Superintendent reports that metering has been "most accurate."

Westinghouse Instrument Transformers offer you the most complete line in the Industry . . . each type and rating is designed for a specific need in metering or relaying applications. Your Westinghouse representative will help you select the right Instrument Transformer for your problem. Or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70652

YOU CAN BE SURE... IF IT'S
Westinghouse
INSTRUMENT TRANSFORMERS

RESISTS HEAT

SAFETY
MINERAL m.i. INSULATED
WIRING
PYROTENAX*
A GENERAL CABLE PRODUCT



OUTLASTS STRUCTURE IN WHICH INSTALLED!

Immune to age-deterioration due to its "all-mineral" construction. Unaffected by high temperatures from current overloads, either accidently imposed or to meet emergency increased power demands.

UNIT INSTALLATION!

No additional mechanical protection required. Safety **B. I.** Wiring is its own conduit. Available fittings permit installation in one operation using standard switch and junction boxes. Smaller diameter saves space, assures neat appearance.

NO VAPOR PASSAGE!

Completely filled with compacted mineral insulation. No need for specially installed seals in the cable run to prevent the passage of gases through the wiring system. Safety **B. I.** Wiring is completely impervious.

COMPLETELY MOISTURE-PROOF!

Simple fittings are available to permanently seal both ends of each run of Safety **B. I.** Wiring. No possible entrance for moisture. Normal concern over this hazard is, thereby completely eliminated.

RIGID YET FLEXIBLE!

Thumb pressure bending, in ordinary sizes, easily fashions orderly wall patterns—conforms wiring to any contour. Once formed, and fastened with standard clamps or straps, Safety **B. I.** Wiring stays put.

*Exclusively A General Cable Product

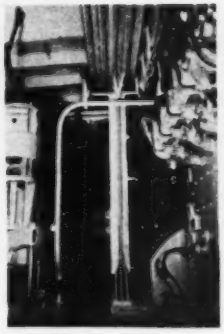
SAFETY m.i. WIRING*

is completely non-combustible. Will neither burn, support combustion nor convey flame.

On board ship, in hospitals, in museums, in art galleries, in chemical plants or in any structure, Safety m.i. Wiring will be received with earnest enthusiasm.

For Safety m.i. Wiring—a new General Cable product—permits operation of the wiring system, even "Under Fire!" The mineral insulation of Safety m.i. Wiring is completely non-combustible! It cannot generate toxic, combustible, or explosive gases. And—there is no service interruption if fires expose the cable to temperatures approaching the melting point of the copper sheath.

The further important advantages of this new General Cable product, as explained below, should warrant your immediate attention, especially if you require the ultimate in quality, service-reliability and permanence of your contemplated wiring of circuits up to 600 volts. Write today for the informative booklet titled, "20 Questions and 20 Answers About Safety m.i. Wiring."



Shown at left is the Safety m.i. installation at the Louvre, in Paris. Placed within the mortar seams of the stone walls, it has created a 100% fire-safe wiring system. Illustrated on the right is the typical usage of Safety m.i. Wiring in the engine room spaces on board a ship.

"More Power to You" ®

GENERAL CABLE
CORPORATION

EXECUTIVE OFFICES: 420 LEXINGTON AVENUE, NEW YORK 17, N. Y.
Sales Offices in Principal Cities of the United States

● It's easy to understand why this butler doesn't share his master's enthusiasm. Only *users* can fully appreciate Koppers Poles.

Utility companies like the *kind* of service they get from Koppers Poles. Trouble-free service. Long service. All of which is reflected in lower maintenance and replacement costs.

Specify Koppers Full-Length Pressure-Creosoted Poles. Your operating records will prove that it is a sound buying practice.

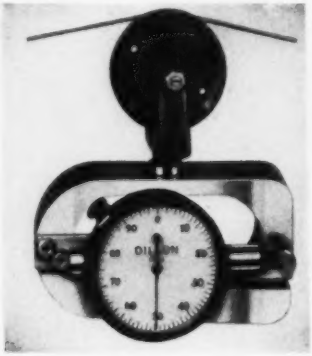
KOPPERS COMPANY, INC. PITTSBURGH 19, PA.

KOPPERS PRESSURE-CREOSOTED WOOD

is available with electric starting and can be supplied with controls which start the plant automatically when regular power fails.

The generator is driven by a four-cylinder air-cooled gasoline engine, requiring minimum maintenance. Available single or three phase, standard or special voltage.

Universal Motor Co, Oshkosh, Wis.



Pressure Gauge

For measuring tension in moving or stationary cable, filament, etc. Deflection of 0.039 in. gives full scale reading claimed within 1% accuracy. Available in 10, 25, 50, 100, 250, 500, 1,000, 2,500, 5,000 lb capacities.

W. C. Dillon Co, Inc, Van Nuys, Calif.

Dry-Type Distribution Transformer

Completely enclosed, non-ventilated, for service on secondary circuits rated 600v and below. Type E supersedes type AJR dry-type transformers; uses class H silicone insulation and operates at 120C rise. Micarta laminated plastic terminal boards. Available in 3, 5, 10, 15, 25, 37½, 50-kva ratings.

Westinghouse Electric Corp, Pittsburgh 30, Pa.

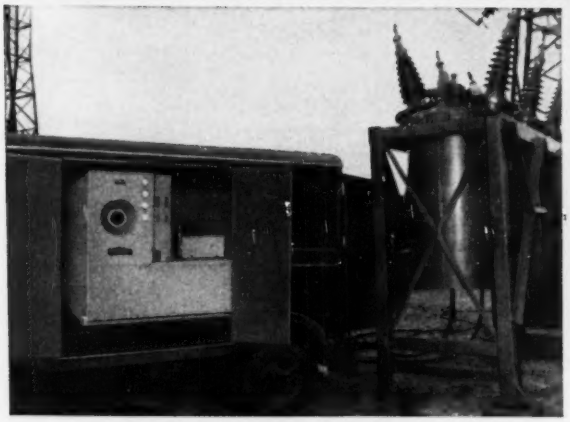
Metal-Sealing Plastic

Said to withstand 200 C, high dielectric strength, thermo-setting plastic for hermetic and gas sealing terminals. Called Melkorite, the material's speci-

(*Continued on page* 192)

BOWSER has the RIGHT answers for these 2 OIL CONDITIONING PROBLEMS

ESTABLISHED 1885



Portable Bowser Hydro-Volifier conditioning unit for transformers, circuit breakers and switches.

...the best PERFORMANCE INSURANCE money can buy!

INSULATING OIL

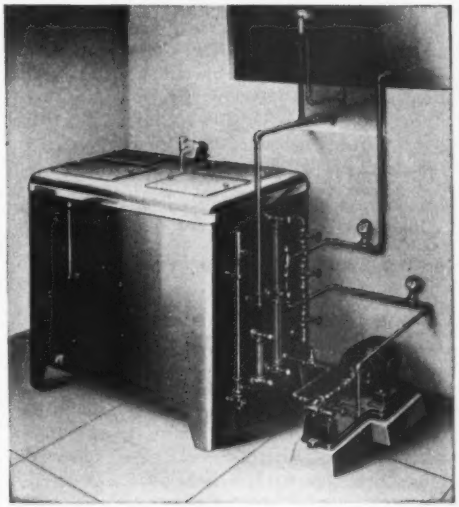
In a SINGLE PASS the Bowser Hydro-Volifier restores oil dielectric to 35 k.v.!
Volatile corrosive acids, gases, dissolved moisture and solids . . . the enemies which promote sludge formation in insulating oil . . . are effectively removed. The process is fully automatic.
NO SERVICE INTERRUPTIONS . . . because this exclusive Bowser process reconditions insulating oils while energized! And less standby equipment is needed.

TURBINE OIL

"Bone dry," crystal-clear oil from a Bowser conditioner is the best stay-on-the-job insurance a turbine bearing can have. Costly bearing failures . . . caused by these 8 destroyers of turbine oil . . . are avoided:

- Turbulence
- Air Entrainment
- Moisture Contact
- Heat
- Metallic Contact
- Inhibitor Removal
- Fly-ash
- Dust

In some plants, turbines served by Bowser units have not had the oil changed for many years.



Bowser oil conditioner serving turbine.

Operating costs are much lower with these Bowser units. May we send you complete data?

BOWSER, INC., 1384 CREIGHTON AVENUE, FORT WAYNE 2, INDIANA

Regional Offices • Atlanta • Chicago • Cleveland • Dallas • Kansas City
New York • San Francisco • Washington, D. C. • Hamilton, Ontario

No. 7- hook-operated . . .

★ *The Type H-U Hi-Voltage Hook-Operated Disconnecting Switch is a single-throw switch for vertical mounting in outdoor service.* It is available in capacities from 400 to 2,000 amperes, 7,500 to 115,000 volts.*

The Type H-U embodies design characteristics that guarantee *certain operation* anytime . . . under any condition . . . even after years of standing idle. Four features are outstanding:

1—Independently hinged blades
2—Stainless steel contact springs
3—Silver-nickel contacts
4—Pry-off lock action

Look over these advantages on the opposite page. They are in keeping with the traditional high quality and positive performance assured by all Hi-Voltage Switches . . . they are reasons for the continued superiority of Hi-Voltage in the air-switch field.

In addition to the hook-operated switch, Hi-Voltage offers these three other types:

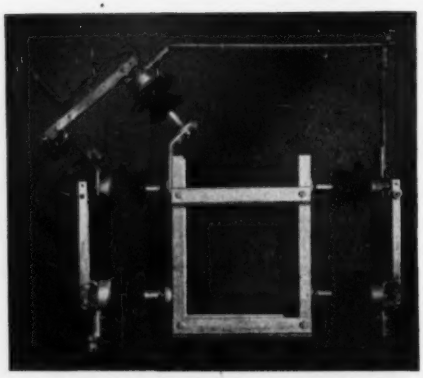
- **Rotating-Insulator, Vertical-Break Switches**
- **Center-Break Switches**
- **Side-Opening Switches**

These designs take care of practically all switch requirements for any station. For those installations requiring remote or automatic operation, there are also available either gas-operated or motor-operated mechanisms.

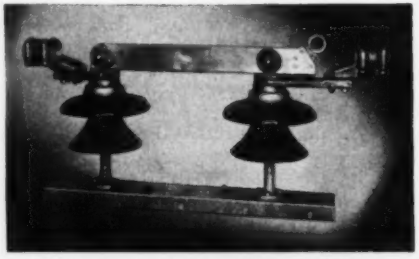
And for mounting switches along with the other substation equipment, Hi-Voltage supplies complete steel substation structures.

Ask your Joslyn Representative to give you the complete Hi-Voltage story.

**Also available for underhung mounting and in double-throw and transfer designs for either vertical or underhung mounting.*



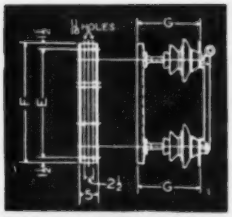
Many special arrangements can be made with Hi-Voltage Hook Switches. Above is shown a compact, economical unit that can be mounted on a beam or girder. Two standard Type H-U's are combined with a by-pass switch that is operated by a lever hinged on the blade.



A 2000-ampere switch is shown here. Note its heavy-duty construction. Contact pressure is maintained and evenly distributed by six stainless steel compression springs at each end of the blade . . . still the best means of assuring correct contact pressures with no undue wear of the silver contacts.

HI-VOLTAGE

type H-U disconnecting switch



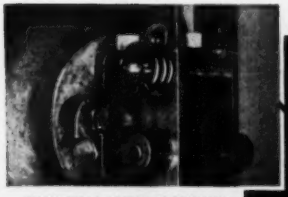
TYPE H-U HOOK-OPERATED SWITCH FOR VERTICAL MOUNTING

TYPE H-U HOOK-OPERATED SWITCHES

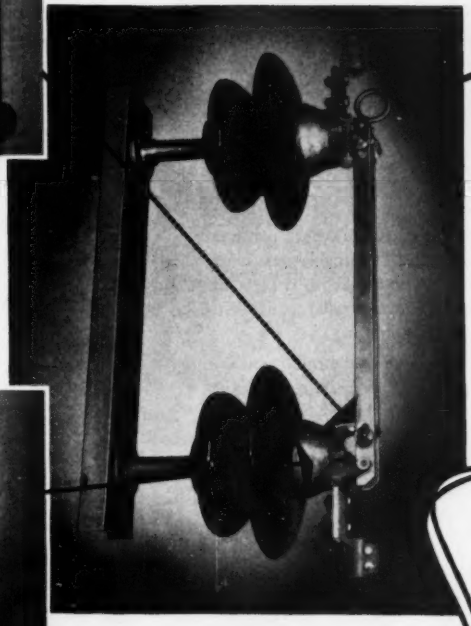
VOLTAGE	DIMENSIONS IN INCHES		
	E	F	G
7,500	18	21	9⅝
15,000	21	24	12⅛
23,000	24	27	14⅛
34,500	30	33	17⅛
46,000	38	41	20¼
69,000	50	53	31¼
115,000	As required		51¾

Hi-Voltage SWITCHES ARE AVAILABLE

from 200 to 3000 Amperes, 7500 to 161,000 Volts for upright, underhung or vertical mounting.

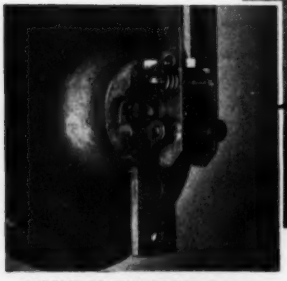


STAINLESS STEEL CONTACT SPRINGS—On all switch models, contact pressure is maintained by stainless steel compression springs of ageless flexibility. Moisture cannot rust them nor interfere with the maximum conductivity they develop.



PRY-OFF LOCK ACTION assures easy opening under ice conditions and when switch location necessitates a pull with the switch stick almost parallel to the blade.

SILVER-NICKEL CONTACTS welded to copper on 600 to 2,000-ampere switches . . . your guarantee of permanent conductivity and non-gauling, corrosion-proof performance.



INDEPENDENTLY HINGED BLADES operate entirely independent of the hinge-end contact. Thus, misalignment which sometimes results from installation can never affect their smooth operation and positive conductivity.

ALSO AVAILABLE!

- Grounding Switches
- Manual and Automatic Control Mechanisms
- Mechanical Interlocks
- Hi-Voltage Fuses
- Cross-arms and Mounting Frames
- And all customary accessories

EQUIPMENT COMPANY

4000 EAST 116th STREET • CLEVELAND 5, OHIO

For better lighting in Baltimore...

AMPLEX
STREET LIGHTING LAMPS

Amplex Street Lighting Lamps bring improved lighting on West Franklin St., Baltimore. Installation made by Consolidated Gas Electric Light and Power Company of Baltimore.

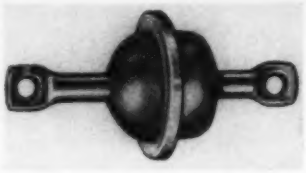
IT'S THE SAME with cities and utilities the country over . . . in fast-growing numbers they're turning to Amplex Street Lighting Lamps These lamps are designed and built for the kind of service that really pays off. They survive the constant jolts and vibration of heaviest traffic . . . maintain their high light output throughout their extra-long-burning lives.

The Amplex line gives you a street lighting lamp of the right type and wattage for every requirement. And for absolute tops in rugged dependability your one best bet is Amplex *Weatherproof Bulbs*. They're made of moisture-resistant "hard glass" that stands up through toughest climatic conditions and cuts service costs to rock bottom.

Get full information about Amplex Street Lighting Lamps and their efficiency and economy on the job. Write Amplex Corporation, Dept. J-11 111 Water St., Brooklyn 1, New York.

AMPLEX

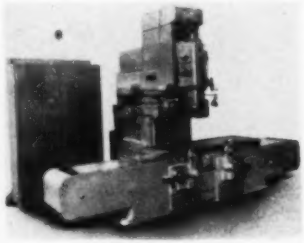
Sealed-Beam Reflector Lamps, Colorbeam Lamps, Spotlites and Floodlites, Industrial Infra-Red Heat Lamps, Vibration and Rough Service Lamps, Street Lighting Lamps, Traffic Signal Lamps, Incandescent Lamps, Fluorescent Tubes, Display Accessories.



fications are: Dielectric strength 8,000v 60 cps, air pressure test 30 psi, terminal pull 25 lb.
Melkor Research Laboratories Inc, Cleveland 7, Ohio.

DC Arc Welder

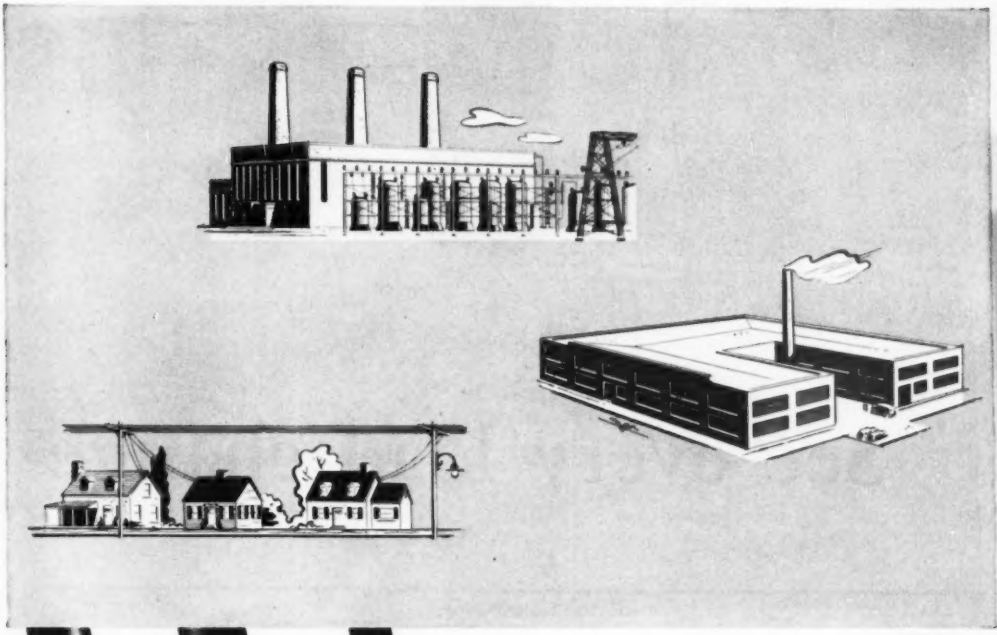
Using magnetic amplifier and selenium rectifier to give high short circuiting current to give a pulsating dc for welding. Available in 4 sizes for all dc welding applications.
Miller Electric Manufacturing Co, Appleton, Wis.

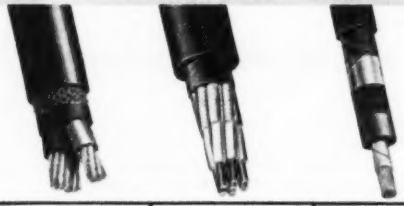


Electronic Controls

Allow speed selection ½ to 25 in per minute on heavy-duty milling
(*Continued on page* 196)

U. S. Electrical Wires and Cables for every purpose





U.S. ROYAL PORTABLE CABLE. Before any construction of U. S. Royal Portable Cords or Cables is offered to the trade, it is put through a series of seven grueling laboratory tests that guarantee dependability.

U.S. LAYTEX CONTROL CABLE. Insulated with 90% pure natural unmilled grainless compound, whose insulation resistance improves in wet locations. Not one reported failure in its twenty years of manufacture.

U.S. POWER CABLE. Insulated with corona resistant Uskorona or Butyl compound, these cables offer an unbeatable reliability on overhead and underground high voltage power applications in wet or dry locations.

From power houses to homes, from mines to mills, from farms to factories—United States Rubber Company has Electrical Wires and Cables to fit every need. Where dependability, long life and economy are essential, U.S. Rubber has the answer to almost any wiring problems your customers may meet.

U.S. Rubber pioneered in developing Laytex® Insulation made of 90% pure natural unmilled grainless rubber. From U.S. Royal Portable Cords and Cables, Aluminum Wires and Cables, Service Entrance and Drop Cables, to Power and Underground Cables, the U.S. Rubber line includes Electrical Wires and Cables of every description, including cables fitted to IMSA Specifications for traffic, fire and police needs.

Write today for our general catalog covering the full line of U.S. Electrical Wires and Cables.

PRODUCTS OF

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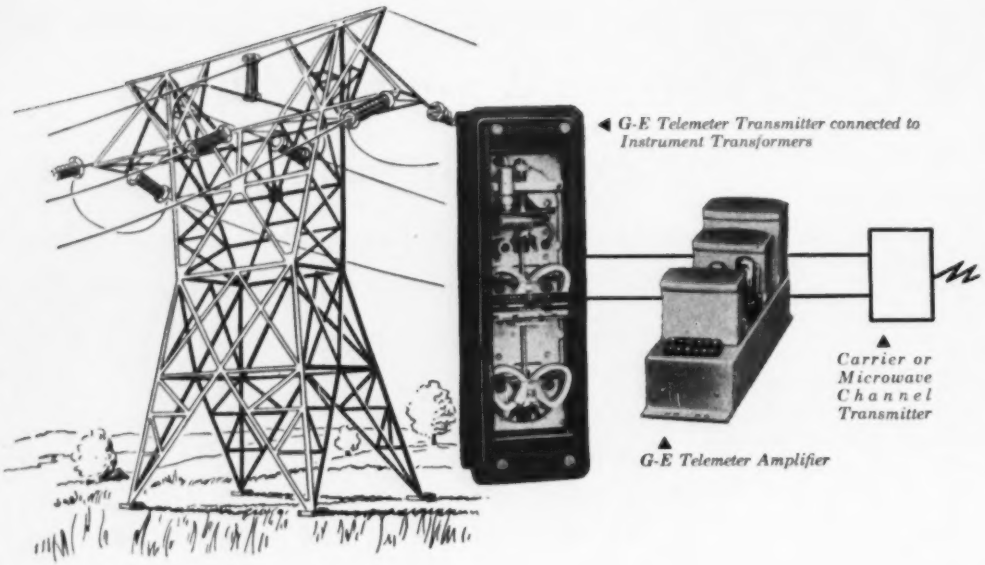
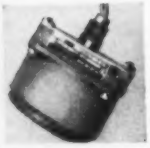
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

Electrical Wire and Cable Department • 1230 Avenue of the Americas, New York 20, N.Y.


G-E Telemeter Transmitter connected to Instrument Transformers
Carrier or Microwave Channel Transmitter
G-E Telemeter Amplifier

See every load change



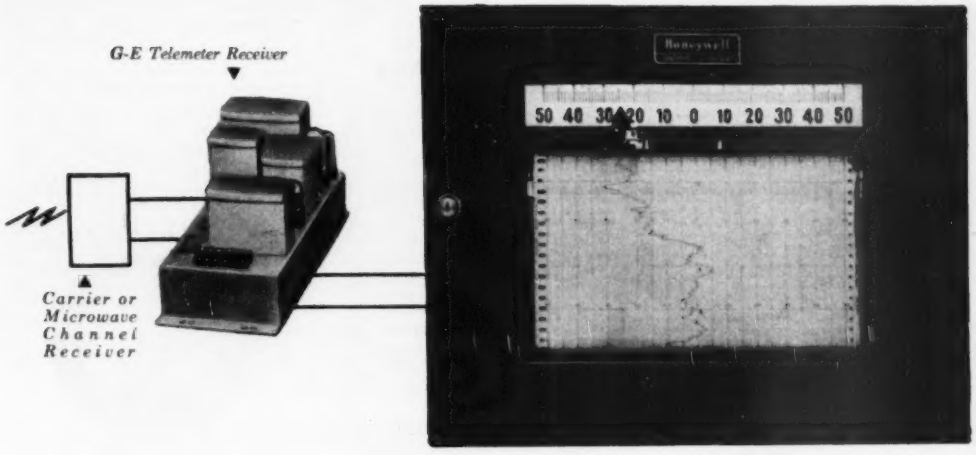
Flexibility... Dependability... for all power plant measurements

The versatile *ElectroniK* Recorder is applicable to measurement of pressure, flow, speed, pH, conductivity, power, current, temperature . . . the *same basic instrument for all*, with changes only in measuring circuit and sensing elements. Use of standard, interchangeable components simplifies maintenance, reduces parts-stocking problems. Single-point and multi-point models are available in a choice of printing speeds, and with chart speeds from ½" to 120" per hour.

The utmost in dependability demanded by power plant applications is insured by *ElectroniK* components . . . life-tested, service-proved, designed for minimum, easy maintenance. These rugged "building blocks"—the high-torque balancing motor, the hermetically sealed converter, the simplified continuous-balance amplifier—typify construction that minimizes the number of moving parts, and that eliminates troubles from dust and atmospheric humidity.

● *Important Reference Data*

Write for Instrumentation Data Sheet No. 9.1-10, "Long Distance Transmission of System Variables"... and for



ElectroniK Recorder

General Electric frequency-type telemetering system with ***ElectroniK*** *strip-chart recorder*

the instant it happens...

through continuous telemetering with ElectroniK RECORDERS

THE ultra-fast telemetering equipment shown above keeps the load dispatcher in constant touch with all parts of the system. It tells him every change in tie line interchange, in station generation and in system load—the instant that a change takes place. Operating over carrier current or microwave channels, it spans distances of hundreds of miles . . . eliminates the delays and uncertainties of intermittent, non-continuous measurement.

The *ElectroniK* recorder presents load data in full, readable detail on its big, 11-inch-wide strip chart, where every significant change and trend stands out for the dispatcher's attention. The rapid response of *ElectroniK* continuous-balance measuring assures full utilization of the inherent speed of the telemetering equipment. And the industry-proved dependability of *ElectroniK* construction means absolute minimum maintenance, and uninterrupted performance.

Your local Honeywell engineering representative will be glad to give you full details. Call him today —he is as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4568 Wayne Ave., Philadelphia 44, Pa. Service available promptly from more than 55 offices in principal cities of the United States.

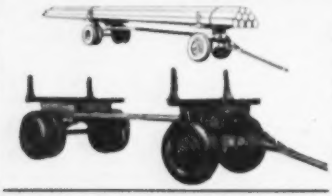
MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

Bulletin 90-2, "Supervisory Instruments for Power Generation."

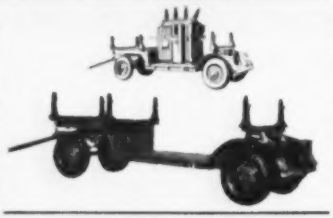
Notes on Eagle Equipment —
Designed to save man-hours and money

TRAILERS

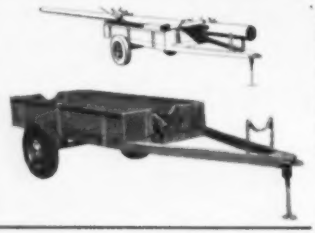
...IN A WIDE RANGE OF SIZES AND TYPES



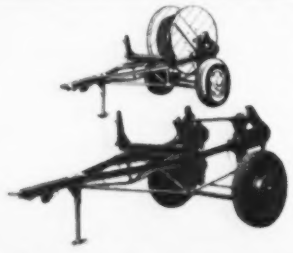
ADJUSTABLE LENGTH POLE TRAILER: easily adjusts to accommodate poles up to 90 ft. long — a big trailer that does a big job. Center pole telescopes. Trails smoothly. Equipped with electric brakes on rear wheels. Get complete information on Eagle Trailer Model 6450.



FOUR-WHEEL LO-BED TRAILER: for easy loading and hauling of heavy bulky units, also suited to pole and general purpose hauling. Five ton capacity, overall length 25 ft. 8 inches. Distance ground to low platform only 25½ inches. Equipped with electric brakes on rear wheels. Get complete information on Eagle Trailer Model 6441.



LIGHT-DUTY CARGO AND GENERAL PURPOSE TRAILER: light-duty, 1-ton capacity trailer for hauling one or two poles, cross-arms, pole hardware, etc. Has pole saddles front and rear and removable end boards. Get complete information on Eagle Trailer Model 7163.



COMBINATION CABLE REEL AND POLE TRAILER: complete with bolsters, stanchions, cable reel saddles. Quickly converted into a pole trailer by removing cable reel saddles and installing bolsters. A practical dual purpose unit, requiring only one trailer license. Get complete information on Eagle Trailer PCP — W-PCP series.

Send today for the complete catalog of Eagle Line Construction and Maintenance Equipment — a useful reference book.

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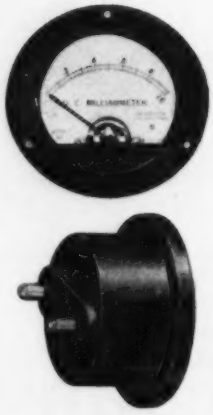
EQUIPMENT ENGINEERED BY AND FOR UTILITY MEN EXPRESSLY FOR THEIR NEEDS

EAGLE MANUFACTURING CO., Appleton, Wis.

Division of The Four Wheel Drive Auto Co.

machine. Controls provide full-wave rectification, armature control, reversing, overload and undervoltage protection, dynamic braking. Electronic controls drive electrical motors which operate the machine. Controls are housed in dust-tight cabinet.

General Electric Co, Schenectady, N. Y.



Ruggedized Meters

Shock mounted in low temperature rubber compound and bonded to the case, the meter movements are rigidly held. Dc or rectifier type ac meters sized 2½, 3½, 4½ in. include all dc milliammeter and microammeter ranges from 0-50 microamp up, dc ammeters up to 50 amp self-contained, dc voltmeters 1,000 ohm per volt ranges 0-1 through 800 v, ac microammeters 0-50 through 1000, ac milliameters 0-1 through 5, ac voltmeters 1000 ohm per volt, and DB meters —12.0, + 6 db.

Hickok Electrical Instrument Co, Cleveland 8, Ohio

Regulated Rectifier

115v, single phase, 60 cps to regulated dc output. Claimed 1% regulation from no load to full load with ± 10% ac line variation. Rms ripple claimed less than 1%. Standard models range from 1.2 to 28.0v, 2.5 to 30.0 amp. Magnetic amplifier construction, no vacuum tubes or moving

FLOOD CONTROL! Two-way radio communication plays an important part in the fight to save lives and protect towns from raging flood waters. Major breaks can be prevented by instantaneous dispatching of repair crews via G-E 2-way radio.

LARGE AREA CONTROL! San Diego Gas & Electric Co. central office communication system is tied in to the mobile net. In 5 years peak load jumped 70%! G-E 2-way radio helps them serve nearly 200,000 customers.

DEPENDABLE COMMUNICATION IN ALL WEATHER! Snow and high winds made line communication impractical for the Black Hills Power and Light Co. of South Dakota. CAS* engineers solved the problem—dependable G-E 2-way radio carries voice messages instantly throughout the system.

TOUGH MAINTENANCE AND REPAIR JOB! Emergency use of radio is illustrated where wire is repaired after severe sleet storm in eastern Pennsylvania. G-E radio in truck, right, was only communication between workmen and dispatching office when instructions were needed quickly.

G-E 2-WAY RADIO IS THE ANSWER

● For complete advice on your communications problem, contact the CAS* man in the G-E office nearest you, or write: *General Electric Company, Section 19112-17, Electronics Park, Syracuse, New York.*

**Communications Advisory Service*

GENERAL ELECTRIC

Get the overhead service cable YOU need...

Make COLLYER your source for Overhead Service Cable...either standard or made-to-order.

NEUTRAL SUPPORTED CABLES

One, two, three or more phase conductors spiralled around the supporting neutral conductor.

1. **DOUBLE LAYER TYPE** — Phase wires have double-layer covering — Performance Grade Rubber Insulation protected by outer sheath of abrasion resistant Neoprene.
2. **SINGLE LAYER TYPE** — Phase wires have single layer covering of Insulating Neoprene.

TWISTED CABLES

Two, three or more conductors insulated with Performance Grade Rubber.

1. **RUBBER and BRAID TYPES**—(a) Conductors twisted together and covered with weather and flame resistant braid. (b) Conductors covered with moisture resistant braid. Twisted cable covered with moisture resistant braid. (c) Conductors covered with weather and flame resistant braid . . . then twisted together. One conductor often of double braid weather proof wire to serve as the neutral.
2. **RUBBER and NEOPRENE TYPE** — Conductors sheathed with abrasion resistant Neoprene . . . then twisted together. One conductor often of Neoprene line wire to serve as the neutral.

CONCENTRIC NEUTRAL CABLES

One, two, three or more phase conductors insulated with Performance Grade Rubber, sheathed with Neoprene, phase conductors assembled either parallel or twisted.

1. **NEOPRENE JACKETED TYPE** — Neutral conductor consisting of many small copper wires applied concentrically . . . then protected with a sheath of abrasion resistant Neoprene.
2. **EMBEDDED NEUTRAL TYPE** — Neutral conductor (many small copper wires applied concentrically) embedded in a covering of felted unspun cotton — weather-resistant finish.

OPEN WIRE SERVICES

Copper or aluminum conductors covered with Neoprene or Polyethylene.

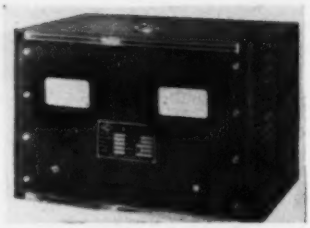
NATIONAL ELECTRIC CODE STANDARDS

Type SD Service drop cables. Type SE, Style A, armored service entrance cable. Type SE, Style U, unarmored Service entrance cable.

Let us know your needs for any and all types of overhead service cables. Write for recommendations.

COLLYER INSULATED WIRE CO.
245 ROOSEVELT AVENUE, PAWTUCKET, R. I.

CHOOSE Collyer



parts, little maintenance and part replacement. Claimed resistant to shock and wear, insensitive to frequency and temperature change. Designed for mounting in standard relay racks. **Inet Inc, Los Angeles 3, Calif.**

MORE NEW PRODUCTS
about which you should know

Fenway Machine Sales Co, Philadelphia 2, Pa, has a portable **nibbler** that cuts through 14 gauge stainless steel cold rolled steel, galvanized iron and softer materials without distortion on sides. It can be used as a hand tool or bench mounted, weighs 7½ lb, is 10 in. long. Minimum cutting radius is ⅛ in. . . . Robertshaw-Fulton Controls Co, Philadelphia, Pa, has an electronic **level indicator** for continuous level measurement without mechanical or pneumatic means, for tanks, hoppers, pressure vessels, etc. An insulated electrode is mounted top to bottom in the tank and connected by co-ax cable to the adjacently mounted indicator.

Crouse-Hinds Co, Syracuse, N. Y., has a 300/500-w dust-tight **lighting fixture** for Class II, Groups E, F, G hazardous locations. Made of cast aluminum with mogul lamp socket, an 18-in. dia aluminum main reflector, a tempered flat glass lens spun into the reflector edge. Lens is impact and heat resistant . . . Westinghouse Electric Corp, Pittsburgh, Pa, has an electric **water cooler** for supplying up to three drinking fountains. Cooler is completely packaged unit with sealed refrigeration system guaranteed 5 years.

Automatic Control Co, St Paul 4, Minn, has a bubbler-type pressure-operated **liquid level control** for industrial processing applications. The

(*Continued on page* 203)

Guy transmission lines *three times stronger* at *half the cost* with CHANCE anchors!

You can cut line construction costs and do a *faster,* more efficient job of anchoring by using CHANCE Anchors for transmission line guying.

Here are FACTS . . . cost comparison figures on an actual installation prove that Chance Cross Plate Anchors were installed in only 2 man hours, while it took 8⅓ man hours to install a log anchor in the same terrain! The cost of materials used was approximately the same for each type of anchor and rod—but only one hole was drilled for the Chance Anchor, while a trench was necessary for the log.

Chance Anchors can withstand much greater strain for longer periods of time than treated log anchors. Laboratory tests on a Chance X-24 Cross Plate Anchor proved it capable of withstanding a pull of 70,000 lbs. for an indefinite period of time with only slight bending, while a creosoted log split under a 20,000 lb. pull in a matter of hours.

The Chance Cross-Plate can be installed in slanted or vertical machine bored holes in any kind of soil. It compares in cost with an average 4 foot treated log.

Other Chance Anchors suitable for transmission line guying are: The Never-Creep — that pulls entirely against undisturbed earth . . . The Steel Cone Anchor —ideal for rocky soil . . . and the Chance 8-way Expanding Anchor — that gives you two four-way anchors in one.

You know it's RIGHT when you specify CHANCE

A·B·CHANCE CO.

CENTRALIA, MISSOURI
SAN FRANCISCO, CALIFORNIA

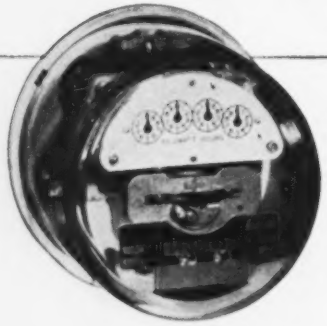
ANCHORS • GUYING FIXTURES • LINE CONSTRUCTION TOOLS • CONDUCTOR CLAMPS
GROUNDING EQUIPMENT • HOT LINE TOOLS • HIGH VOLTAGE SWITCHES • CUTOUTS

FIND OUT WHY!

It's wise to use Chance Anchors instead of "dead-man" logs or slugs. Write today for test records and actual cost comparisons. We'll send you reasons why your next transmission line should be guyed the stronger, low-cost way — with CHANCE Anchors.

CS2-13

What would YOU like to know about metering?

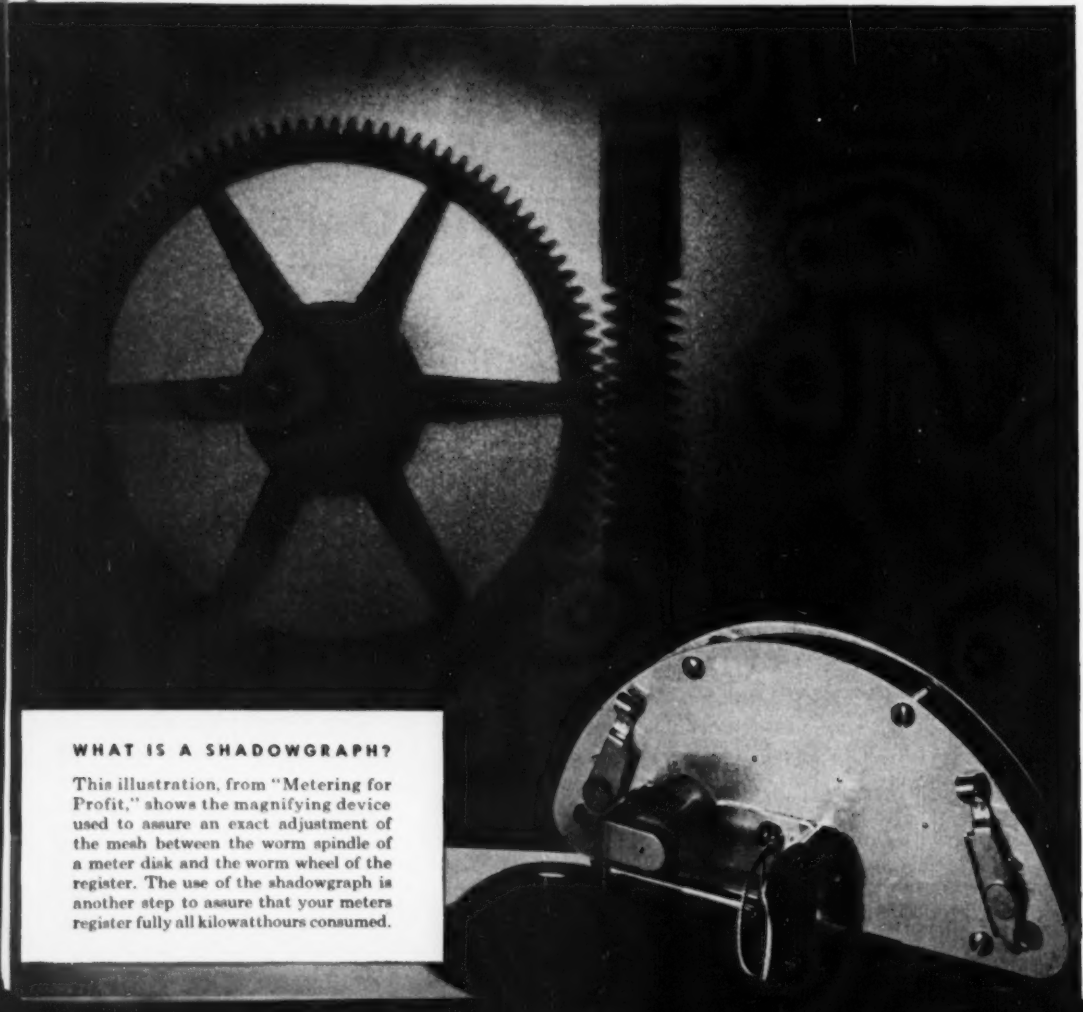


Meters are important to everybody in the Electric Utility Industry — not only because they are the operating components through which every cent of revenue is measured — but, because modern meters can help the industry obtain the maximum benefits in Metering for Profit.

Would you like to know how modern meters can promote good public relations?

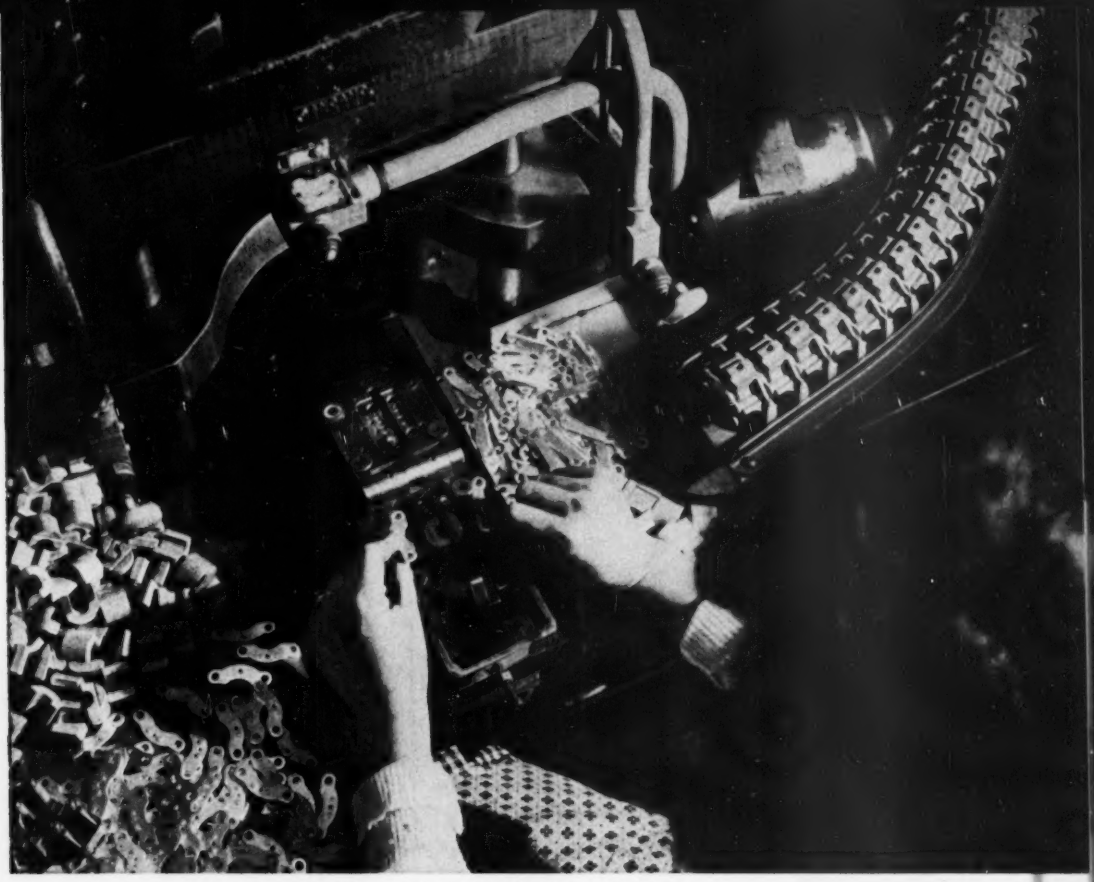
Would you like to know how accurate meters facilitate fair pricing? How dependable meters can reduce operating costs? And, how well-designed meters save operating and maintenance expense for your company?

If you are interested in the answers to these, and many other questions, get your copy of "Metering for Profit". It's yours for the asking.



WHAT IS A SHADOWGRAPH?

This illustration, from "Metering for Profit," shows the magnifying device used to assure an exact adjustment of the mesh between the worm spindle of a meter disk and the worm wheel of the register. The use of the shadowgraph is another step to assure that your meters register fully all kilowatthours consumed.



HOW DO PERMANENT MAGNETS REDUCE HIGH BILL COMPLAINTS?

Damping magnets control the speed of the meter. Accuracy depends on the permanence of their strength. Millions of meters equipped with Alnico magnets have been in operation for years without a report of a single one of them speeding up in service due to loss of damping strength.

Write for

"METERING FOR PROFIT"

A non-technical report to utility company personnel concerning watthour meters. If you are interested in metering and its effect on profits, it should be "must reading". The coupon will assure you of a copy.

SANGAMO

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

SANGAMO ELECTRIC COMPANY, Springfield, Illinois

Please send me my free copy of "Metering for Profit"

Your Name_____

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Company_____

City and Zone_____ State_____

SM52-10

ROCKBESTOS PNR CONTROL CABLE

provides

More Service Hours, Uses Less Space

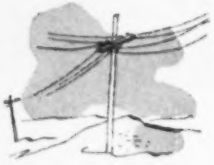
than Conventional Cable

46% smaller in area* . . . 28% smaller in diameter*, Rockbestos PNR helps you extend critical steel conduit allotments...provides substantial savings in installed cost. Its smaller size means you can put 12 conductor cable in conduit where you now use 6 or 7 — or you use smaller conduit and fittings to save on steel and installation costs.

Compare the advantages of PNR shown below, and you readily see why Rockbestos PNR is your best buy.

Dielectric break over 40 times operating voltage.

Lighter and smaller. Easier to handle, store, ship, pull through conduit.



Versatile . . . bury it in the ground! Hang it on a pole! . . . Use it in a conduit.

Stands weather . . . sunlight, chemicals, oil, grease, gasoline, alcohol.

Flexible to —25°C (—13°F). No cracking!

Rated 600 volts . . . conductor operating temperature 168°F (75°C). Available #12AWG-19/25, #9AWG-19/22. Any number of conductors.

ROCKBESTOS PNR

. . . another different, better cable by

ROCKBESTOS PRODUCTS CORPORATION, NEW HAVEN 4, CONN.

originators of **A. V. C.** cables

New York • Cleveland • Detroit • Chicago • Pittsburgh • St. Louis
New Orleans • Los Angeles • Seattle • Oakland, California

*Average determined by comparison with competitive control cable

More New Equipment

(*Continued from page* 198)

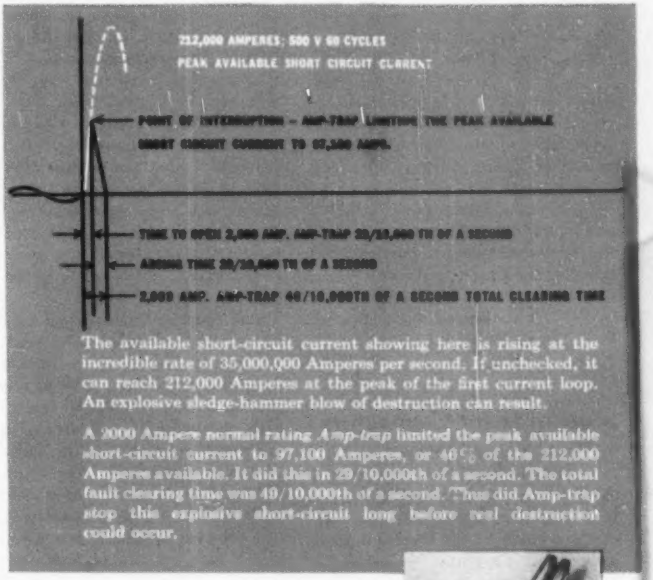
control passes air through liquid, measures level by pressure required . . . Standard Pressed Steel Co, Jenkintown, Pa, has welded all-steel **drawer units** which can be bolted together for varied storage space. Drawers are available 14 x 15 x 5 in, 14 x 20 x 5, and 20 x 20 x 6 in.

Van Cleef Bros Inc, 7800 Woodlawn Ave, Chicago 19, Ill, now has phenolic **wire connectors,** available in four standard sizes. They are known as DB connectors . . . Skilsaw Inc, 5033 Elston Ave, Chicago 30, Ill, has a portable **electric plane** for flat surface and edge planning, the Model 676. Lever controls depth in 64-in gradations, to cut capacity of ⅛ in. Full 3-in cut width, cutter head moves 13,500 rpm to give a surface said to require no sanding. Weight 10½ lb.

Logistics Research Co, 141 South Pacific Ave, Redondo Beach, Calif, has **a digital graph plotter** for plotting activities at remote points, via wire or radio impulses. Plot made by ball point pen. Self contained power supply operates on 110 v ac, can be controlled externally or remotely. Current to be handled is at least 0.6 amp at 28 v dc . . . Fyr-Fyter Co, Dayton, Ohio, has one- and two-quart vaporizing liquid **fire extinguisher,** Model 3, which features one-hand operation, claims 30-ft stream. Vaporizing liquid is discharged in 17-25 sec by force of pressurized nitrogen, said to be effective for electrical fires.

Adalet Mfg Co, Cleveland, Ohio has a series of canvas-base phenolic insulating **cable racks,** claimed to have high tensile, flexural and dielectric strength. Racks are standard or clamping type, are divided into 300v or under, or over 300v groups . . . Petersen Engineering Co, Santa Clara, Calif, has the "Pengo Jr" **pilot bit** for augers, with a fishtail design instead of a centerpoint. Faster boring is claimed. Bit fitted with standard thread to fit all Danuser augers from 6-in dia up. Velocity Power Tool Co, 7505 Thomas Blvd, Pittsburgh 8, Pa, has an automatic acetylene-air **gas torch,** weighing 12 oz, said to give instantaneous heat to 2800 F. ⅛, $\frac{3}{16}$ and ¼-in combustion tubes available for heavy to precision work.

how fast can you stop this dangerous short-circuit?


212,000 AMPERES, 500 V 60 CYCLES
PEAK AVAILABLE SHORT CIRCUIT CURRENT
POINT OF INTERRUPTION – AMP-TRAP LIMITING THE PEAK AVAILABLE SHORT CIRCUIT CURRENT TO 97,100 AMPS.
TIME TO OPEN 2,000 AMP. AMP-TRAP 29/10,000 TH OF A SECOND
ARCING TIME 29/10,000 TH OF A SECOND
2,000 AMP. AMP-TRAP 49/10,000TH OF A SECOND TOTAL CLEARING TIME

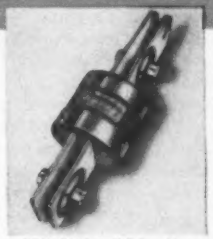
The available short-circuit current showing here is rising at the incredible rate of 35,000,000 Amperes per second. If unchecked, it can reach 212,000 Amperes at the peak of the first current loop. An explosive sledge-hammer blow of destruction can result.

A 2000 Ampere normal rating *Amp-trap* limited the peak available short-circuit current to 97,100 Amperes, or 46% of the 212,000 Amperes available. It did this in 29/10,000th of a second. The total fault clearing time was 49/10,000th of a second. Thus did Amp-trap stop this explosive short-circuit long before real destruction could occur.

SHAWMUT

Amp-trap ✲

"T. M. REG. U.S. PAT. OFFICE"



2000 AMP. 600 V Amp-Trap

Lightning fast *Amp-trap* not only prevents Supercurrents from building up to full magnetic or thermal destructive force — it actually destroys them.

Amp-trap gives Protection Engineers, Switchgear Designers, Contractors and Users new freedom and flexibility in laying out low voltage systems. *Amp-trap* solves the Supercurrent interrupting problem. Available in all standard sizes *Amp-traps* may be used with or without circuit breakers. Write for bulletins.

REGISTERED UNITED STATES PATENT OFFICE — Est. 1893

AMP-TRAPS — "Hands At The Switch"

THE CHASE-SHAWMUT CO.

370 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS

LETTERS TO THE EDITOR

"Today's Challenge" —Reproduced

To the Editor:

We think a reproduction of "Today's Challenge to our Industry—Sell or Else," by our president, Mr. Charles E. Oakes, as a mailing with a personalized letter on the front, and a reproduction of your editorial on Mr. Oakes . . . reproduced on the back, would be effective in our continual efforts to get still closer cooperation with our program on the part of sales allies in the manufacturing, distributing, and retail fields.

Incidentally, I have already received two or three requests for specific and further information on matters mentioned in the article from your readers.

J. M. Stedman
General Sales Manager
Pennsylvania Power & Light Co
Allentown, Pa.

Standards for Connectors

To the Editor:

In your Oct. 27 issue you printed the Performance Standards for Split-Bolt and Vise Type Connectors recently released by the Electrical Service Connector Institute. As one of the Committee, we were very pleased indeed that you published these new standards.

We believe, however, that there is a certain amount of background and reason for the new approach to the performance problems that these new standards present, which should be explained to the utilities and their engineers.

The currently published Copper Wire Performance Standards, which the industry has released through its official association, the Electrical Service Connector Institute, should prove of considerable value to the utilities, insuring minimum standards of quality for connectors purchased from members of the Institute and aiding the utilities in their testing programs.

After many months of study and testing, the Standards Committee of the ESCI came to the conclusion that the following properties of the connector should be measured; Clamping force, reusability, relaxation, torque strength, and pull-out. The manner in which these properties are specified in the new Standards represents a change in concept from general practice in the past as will be explained in the following discussion of each test.

The new Standards consider an adequate clamping force as the prime requisite of a good connector. Resistance of the joint, which in the past has often been regarded as the most important test, has yielded its place to the force which can provide the low resistance connection. By means of recently developed testing apparatus, clamping force vs. tightening torque can be determined quickly and accurately. Also, the relationship between clamping force and joint resistance has been established. So, in effect, the clamping force test measures the ability of the connector to produce low resistance joints when properly installed.

Joint resistance measurements were not considered a feasible means of determining comparative performance because of the difficulty of maintaining uniform wire conditions. Connections made on absolutely oxide-free copper wire would probably all be initially satisfactory even though the connectors used varied considerably in clamping force. Since absolutely clean wire does not exist in general practice and since a high pressure or high clamping force is the best and practically the only means of insuring a low resistance connection using wire under field conditions, it was agreed by members of the Standards Committee that an adequate clamping force should be the prime test requirement of a good connector.

Clamping force is especially important because the broader contact areas created between the wires by the higher clamping force are less affected by subsequent oxidation or weathering than small narrow contact areas. Also, there is test evidence that high pressure connections retain their initial pressure level better than low pressure connections. This is especially true of stranded wire connections where a slipping or reorientation of the strands may occur if the contact surfaces between strands are not sufficiently broad to prevent slippage.

The Reusability Test of the new Standards is related to the clamping force rather than to the tightening torque. In the past some experimenters measured the highest torque at which a connector is reusable as a prime test of performance. However, such a test greatly penalizes the more efficient connector which produces a higher clamping force for a given torque on the nut since it is obviously more highly stressed at this torque than the less efficient connector.

Protection against mechanical failure is provided for in the new Standards by a Torque Test which insures the user that the connectors may be tightened to given torques beyond those ordinarily used or recommended, without mechanical failure. Ultimate torque itself is not regarded as a quality test beyond the safety torques specified in the Torque Test because such a test fails to do justice to the more efficient and consequently more highly stressed connector as explained above.

The Relaxation Test is probably the most difficult test to evaluate since the value obtained for relaxation will depend to a large extent on the elastic constant of the testing machine. The test may, however, eliminate connectors which are made of soft alloys subject to excessive creep.

The Pull Out Test, as it remains in the new Standards, is related to the torque which will produce the required clamping force rather than to any given value of torque. It is true that most utilities will not be equipped to make the clamping force test, which in turn makes it impossible to follow the new Standards in determination of reusability, relaxation, and pull-out. However, it was felt that the most logical test program should be specified regardless of certain apparatus difficulties. It is probable that test equipment for determining clamping force will be standardized shortly and will then be made available by the ESCI or its member companies.

It was generally felt that the Mercurous Nitrate Test was not a reliable accelerated test of stress corrosion cracking and it was, therefore, not included in the new Standards.

Standards of performance for aluminum wire connectors and bi-metal connectors are not now available, but it is anticipated that work on standards covering these categories will be started at some later date.

Ford Pennell
Vice President
Jasper Blackburn Corp
St. Louis, Mo.

New G-E Rapid Start lamp needs no starter, cuts maintenance

IN THE NEW RAPID START lamp circuit G-E has been able to eliminate the starter required in standard lamps to pre-heat the cathode. For that reason, maintenance is even easier, more economical than before.

This new General Electric *Rapid Start* lamp was made possible by two G-E developments: an improved triple-coil cathode that replaces the double coil in standard fluorescent lamps, and a *Rapid Start* ballast. Together, they give General Electric *Rapid Start* lamps almost instant starting and smooth, simple operation.

G-E *Rapid Start* fluorescent lamps are rapidly becoming available. Many leading fluorescent lighting fixture manufacturers are incorporating the new lamps and ballasts in their latest equipment. These two newest developments of G-E research are another reason why you can *expect* the best value from General Electric fluorescent lamps.

You can put your confidence in—

GENERAL ELECTRIC

leading photoelectric control

FOR STREET LIGHTING

The F-P Series 63300B Control is the latest unit in a proven line of photoelectric controls for street lighting that have been operating successfully on lighting circuits for over seven years. Today there are more than 35,000 F-P Controls in use by over 700 utilities.

Fisher-Pierce has maintained leadership in photoelectric street lighting control through:

PERFORMANCE — F-P Controls provide street lighting safety because lights are on *when needed*, regardless of time of day. Because the control is photoelectric, it depends only on natural light values for operation. There is no mechanical device to get out of phase with actual daylight conditions.

ENGINEERING — The F-P Series 63300B circuit and technical operating features are the result of years of field experience. The development work and testing was performed in conjunction with utility engineers. The Fisher-Pierce organization is in a position to help utilities in planning, installing and maintaining control systems.

ECONOMY — F-P Controls provide true economy: purchase price and cost of installation are low. Maintenance is practically negligible as compared to other control methods. To give you a picture of this F-P economy, we will be glad to refer you to some of our customers who have had extensive field experience with these controls.

Write for Bulletin 63300B.

FP

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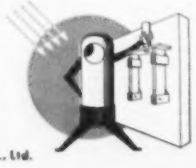


WHAT THEY'RE SAYING

At Industry's Meetings

TV Vitalizes Science

Dr. E. W. Engstrom, vice president in charge of RCA Laboratories Division, before the Communications Symposium of the Centennial of Engineering at Chicago, Ill.

Vast electronic knowledge accumulated in building television has already begun to vitalize many other fields of science for public benefit. The techniques of television, although fairly well confined so far to the television industry itself have spilled over into radar design, pictorial communications, electron microscopy and new ideas for tubes and circuits. This process will surely gather even further momentum in the next few years when many more advances will be made in this field.

The television networks are constantly striving to raise the standards of all kinds of presentations by careful programming and by gradually increasing TV's intellectual contribution through the content and techniques of their offerings.

Modern transportation as applied to modern warfare has brought nations uncomfortably close, a proximity that threatens destruction. Television will counter this threat by enabling a proximity that breeds understanding and friendliness. It will provide an interchange, heretofore unobtainable, of ideas and culture that will hasten the day of world peace.

Selling Is A Continuous Job

T. J. NEWCOMBE, Appliance Division sales manager, Westinghouse Electric Corp, before the annual meeting of the Public Utilities Association of Virginia at White Sulphur Springs, West Virginia.

Selling is a never ending job, and a regional utility group is in an excellent position to give the needed acceleration to selling programs aimed at the American housewife. Many sales people in the electric appliance business did not enter the field until the postwar period and as a result, few salesmen understood the transition from a seller's market to a buyer's market and had very little training to cope with it. This presents a challenge to the electric appliance industry at all levels. Three basic problems that must be solved to achieve better selling

Here's Proof of Performance...

Over 99% of the poles installed by the Chesapeake & Potomac Telephone Co. in Washington, D. C. are Pressure-Creosoted

IN 1930 the Chesapeake & Potomac Telephone Company turned to pressure-creosoted poles to secure longest possible life for their 67 square mile network of telephone poles in the Washington, D. C., area. The three poles shown here, located in an alleyway between 16th and 17th Sts., S. E., have been in service since that time and are good for many additional years' service.

Pressure-creosoted poles are inspected every six years until they have been in service 17 years and every three years thereafter. On the basis of these inspection tests, the Company feels it should realize at least 30 to 35 years of service out of each pole.

When you choose a wood preservative, let records like these be your guide.

Creosote Oil contains not one but many compounds whose toxicity and permanence ward off attack by such wood destroyers as termites, fungi, dry rot and marine borers.

When you use treated wood, be sure it is pressure-creosoted with U·S·S Creosote Oil—a product of the world's largest tar distillation plant. For complete information, contact our nearest Coal Chemical sales office or write directly to United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pa.

U·S·S CREOSOTE OIL

USS

2-1682

UNITED STATES STEEL

U. S. TOBACCO COMPANY INSTALLS RANDOLPH AUTOMATIC FIRE SYSTEM

The U. S. Tobacco Company's large multiple unit dust collector presented an unusual and worrisome fire hazard, but this 150 pound Randolph Automatic System not only automatically detects and extinguishes any fire that might occur in the unit, but also shuts down the dust collector blower, and rings an alarm located on one of the lower floors of the building.

Officials of the U. S. Tobacco Co., and the Nashville Fire Department inspect the Randolph Automatic System installed on giant dust collector.

Kills Fire, Sounds Alarm and Shuts Down Machinery

As in the U. S. Tobacco installation, Randolph Systems, in addition to automatically killing the toughest fires in split seconds, can also be equipped with duct and door closers, motor, fan and machinery shut-offs, warning alarms and other auxiliary safety devices. Systems are designed for both local application or total room flooding and are ideal for dip tanks, baking ovens, spray booths and hundreds of other applications.

Battery of Randolph CO_2 Cylinders in U. S. Tobacco system.

Free Catalog and Engineering Service Available Without Cost

Randolph's FIRE HAZARD INDEX gives correct equipment and methods for protection against 590 typical fire hazards. Write for your free copy today. Address: Randolph Laboratories, Inc., 12 E. Kinzie St., Chicago 11, Ill.

results. Number one is to develop a renewed faith in sales people, by showing them that they do have a future in the electric appliance business. Secondly, sales people must be told how to be more effective in their selling technique and last of all sales must be geared for a mass selling program.

Mass selling is keyed to three programs: first, by developing more effective means of creating mass interest in electric appliances; next, by making it more convenient for customers to buy and finally, by making sure that customers are made happy and satisfied with the appliances that they have purchased. Utility executives must speed up their selling methods to get an increased share of the consumer's dollar that will absorb the electric appliance industry's mass production capacities. Utilities can give local emphasis and leadership in plans and programs, but the entire electric appliance industry must accelerate and expand their selling efforts as a force to really do the outstanding sales job which is ahead.

Glass Welding by Electricity

M. R. SHAW, JR, research engineer, Corning Glass Co before the Middle Eastern District Meeting of the AIEE at Toledo, Ohio.

The extension of the electrical welding process to include glass has opened up a vast new field to the electrical art. Hundreds of kva of installed capacity are at the present time turning out highly technical products at a rate such as to permit them to reach the mass market. Electric glass welding processes have been developed for the handling of all kinds of joints in both straight and curved bodies.

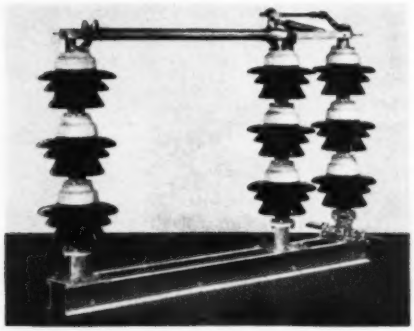
The advantages of electric glass welding may be attributed to the following factors: It is possible to develop higher temperatures within the body than with flames alone, a faster heating rate is possible without danger of destroying the surface of the material, and the highly localized nature of the heat eliminates the possibility of distortion in the main body of the parts. Accurate control of the heat is possible, resulting in better quality of finished product. The nature of the process is such that it may be carried out by relatively unskilled personnel. In the welding process, 60-cycle potentials as high as 20,000 volts, high frequency, and ultra-high frequency current can be used.

90% less wear on switch parts

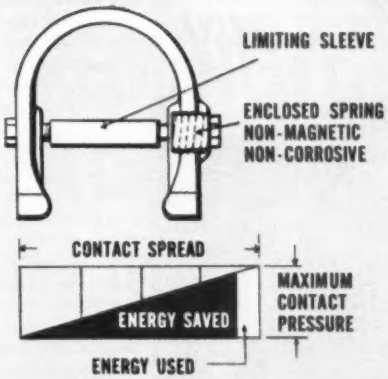
3E 8400 Airbreak Switch uses exclusive limiting sleeve for easy closure and long wear

When the blade pressure on an 8400 Airbreak Switch is released, a 3E patented limiting sleeve takes on 90% of the spring pressure. Thus when contact is closed again the switch has to rebuild only 10% of the balanced high pressure . . . the illustrations and graphs at the right show how 3E gives you these important advantages.

1. Minimum amount of energy required to set up contact pressure, resulting in minimum wear.
2. Practically no variation in contact pressure due to wear, or over or under mechanism travel.
3. Visible indication of correct contact pressure by free limiting sleeve.

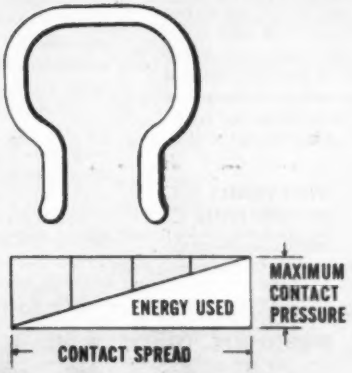


115 KV, 600 ampere, 8400 type Airbreak Switch.



MODERN 3E DESIGN

CONVENTIONAL DESIGN



3E

FOR FULL DATA WRITE
FOR NEW BULLETIN 327

8400 AIRBREAK SWITCH

ELECTRICAL ENGINEERS EQUIPMENT CO. MELROSE PARK, ILL.

On-the-Job

Cutting

OF POWER CABLE

Made easy

NEW HYDRAULIC

MANCO GUILLOTINE

Bites right through underground primary cable. Accommodates all sizes of cable to 3½" O. D. Fast, portable . . . can be used in any position. Ideal for use in maintenance splicing and renewing cable as well as high speed salvage cutting. Blades available for no deformation cutting to 2½".

Model 30

WIDE VARIETY OF PUMP UNITS

The Guillotine Model 30 is available with manual, compressed air, or electric hydraulic pumps.

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BRADLEY, ILL.

SEND COUPON OR WRITE

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Send me information and prices on Guillotine Model 30.

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Firm _____

Street _____

City _____ Zone _____ State _____

Electrical Disturbances

CARLETON F. MAYLOTT, engineer, Bendix Aviation Corp, before the Fall General Meeting of the American Institute of Electrical Engineers at New Orleans, La.

While ideal radio interference control is approachable but unattainable, electrical and radio engineers can eliminate one of the major sources of interference, that is man-made electrical disturbances.

Interference is any electrical disturbance which causes malfunctioning of electronics equipment. Despite marked engineering advances in certain circles, radio interference control is relatively limited and unscientific in practice. Progress has been hampered by imperfect knowledge of the problems, poor dissemination of knowledge, pride of personal and group opinions, trade secrets, economic limits, and human inertia. There are surprisingly few experts of surprisingly limited experience. There are serious disagreements among them about ways and means and limits of radio interference control. Test equipment, methods, and specifications are not yet standardized, suitable, and scientific. The situation approaches chaos and can only be rectified by improved organization.

Besides man-made interference, other undesirable influences on radio reception include: undesirable signals from transmitters using the same, adjacent, or image-related frequencies, atmospheric or natural static, celestial radiation or cosmic noise, microphonic tubes, ac hum and poor connections.

Although the problem of interference has plagued users of this equipment from the time radio communication became feasible, comparatively little has ever been done about it. The Federal Communications Commission has regulated many electrical devices that cause radio interference, and will regulate more, but so far they have refrained from using their full authority to regulate all incidental radiation. It is awaiting action by voluntary agreements between manufacturers as far as possible. This means that radio interference control will be enforced, partly by law and partly by public opinion. In areas where the latter fails the former may take over. Both methods have obvious disadvantages. The possibility of legal control poses both an opportunity and a threat to industry. Fortunately some manufacturing groups have already recognized that fact.

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ELECTRIC POWER

(Vol. II, Pender's Electrical Engineers' Handbook)

FOURTH EDITION

Edited by Harold Pender and William A. Del Mar with 71 Contributors

Year after year this comprehensive book is becoming more widely accepted as *the* handbook for electrical engineers, technicians, contractors, manufacturers and research workers. Here, in one compact, encyclopedic volume, are all the tables, charts, diagrams and illustrations you want at your finger tips for daily reference. Here, too, is all of the up-to-date data you need on all important subjects such as: resistors, rheostats, capacitors, reactors, batteries, direct current machines, transformers, power rectifiers and many others.

71 of the country's top-flight engineers, scientists and teachers—each a recognized specialist in his own field—contributed to this great work. *"When tested (as a reference), the fourth edition of the now famous Pender-Del Mar . . . comes through with flying colors,"* writes A. L. Samuel of IBM in *Review of Scientific Instruments.* Yet ELECTRIC POWER costs you less than half a cent per page! Order your copy *today.*

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NOW! Do your construction fastening up to 100 times faster with

NEW CARTRIDGE-POWERED MODEL 450

REMINGTON STUD DRIVER

. . . and do it safely!

This revolutionary tool attaches steel or wood structural pieces to concrete or steel surfaces in seconds . . . cuts costs and working time on construction jobs. Completely self-powered, the Stud Driver sets as high as 5 studs per minute . . . with no outside power source or other equipment required. Studs have pull-out resistance as high as two tons!

Test-proved to be the world's finest and speediest fastening system, the Model 450 Remington Stud Driver is made by Remington Arms Company, Inc., *America's oldest and foremost sporting arms manufacturer*. Price for Model 450, complete in rugged steel carrying case—only $119.50. To obtain detailed information on this time and money-saving tool, and for the name of your nearest distributor, fill out and mail the coupon below.

Speeds all these jobs . . . and many more!

1. Attaching conduit and panel boxes to steel, concrete or brick.
2. Anchoring fluorescent and other lighting fixtures in concrete.
3. Radio and television fastening.
4. Fastening conduit clips to concrete or steel.
5. Fastening eye bolt in concrete for stringing wires.

Simply hand-assemble stud and power cartridge, load as a unit in easy-to-open Remington Stud Driver, and close.

Press loaded Stud Driver firmly against surface, depress safety lever and pull trigger. Explosive charge imbeds stud solidly.

"If It's Remington—It's Right!"

Remington DUPONT

Remington Arms Company, Inc.
Industrial Sales Division, Dept. EW-11
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I am interested in obtaining detailed information on the Model 450 Remington Stud Driver.

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Firm _____

Position _____

Address _____

City _____ *State* _____

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Carl Arvidson Named a VP

Consumers Power official is advanced from general supervisor's post. Wilkins and Wall are promoted

CARL E. ARVIDSON

Carl E. Arvidson has been elected vice president in charge of electric production and transmission of Consumers Power Co. He succeeds LeRoy L. Benedict, who has retired after 33 years' service with the utility.

Named to Secretarial Post . . . The company has also announced the appointment of Edwin C. Wilkins, of Commonwealth Services, Inc, New York, to the position of assistant secretary. Arvidson's post as general supervisor of electric production and transmission will be filled by Harry R. Wall, his assistant.

The newly elected vice president has been associated with Consumers since 1924. He has filled various posts in power sales, distribution, general engineering, electric construction, and production and transmission. He has also served for a time as assistant to James A. Brown when the latter was a vice president of Commonwealth & Southern Corp in New York.

Served as General Supervisor . . . From 1947 to 1950 Arvidson was Consumers' general supervisor of electric construction. In 1951 he was made general supervisor of electric production and transmission after serving for a year as assistant general supervisor.

Wilkins has been affiliated with Commonwealth Services and its predecessor companies throughout his career. He joined Hodenpyl-Hardy & Co, New York, in 1922 and served successively as assistant secretary of Commonwealth Power Corp, Allied Power & Light Corp, and Commonwealth & Southern. Upon the dissolution of Commonwealth & Southern in 1949, he retained a similar position with the newly organized, independent successor firm, Commonwealth Services.

Wall came to Consumers this October from Commonwealth Associates, Inc, a subsidiary of Commonwealth Services. During his career he was connected with various utility companies including Cleveland Electric Illuminating Co and Commonwealth & Southern.

Started in 1919 . . . Benedict joined Consumers' production and transmission department in Grand Rapids in 1919 as assistant to the division superintendent of P&T Western Division. He later became division superintendent.

In 1945 Benedict was made general supervisor of the department which has general supervision of Consumers' more than 70 steam and hydroelectric generating plants and the company's state-wide network of high voltage transmission lines and substations. He was elected a vice president in 1950.

David D. Moffat, Jr, has been made assistant to the president of Utah Power & Light Co. Moffat, with Utah P&L since 1929, formerly was assistant to J. A. Hale, vice president.

E. W. Petersen has been appointed general sales manager of American Blower Corp. Petersen, who joined the company in 1923, has been assistant general sales manager since 1951.

C. B. Chunn, formerly system construction superintendent for Southwestern Public Service Co, has been named an administrative assistant of the company. Chunn's successor is **Glen D. Chase,** construction superintendent of the utility's Plains Division. Chunn, who has been with Southwestern PS since 1929, will now handle problems pertaining to standardization of transmission and distribution systems. Chase has been with the utility for almost 27 years.

Owen L. Taylor has been named manager of engineering for Bryant Electric Co, a wholly owned subsidiary of Westinghouse Electric Corp. Taylor succeeds **E. E. Forstrom,** who will retire early next year. Taylor, who joined Westinghouse in 1939 and Bryant in 1951, will be responsible for the direction and supervision of activities and personnel in the engineering department.

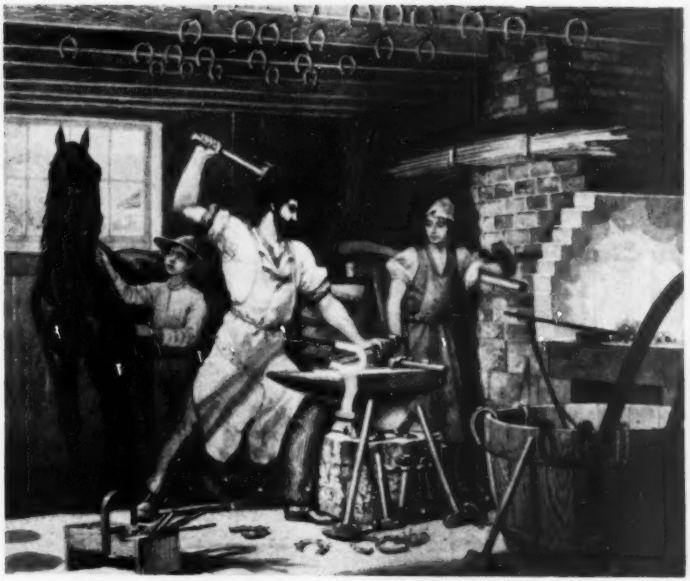
ROBERT P. LIVERSIDGE

Liversidge Elected a VP by Philadelphia Electric

Robert P. Liversidge has been appointed vice president in charge of operations for Philadelphia Electric Co.

Liversidge, who has been serving as manager of electric operations since last March, joined Philadelphia Electric in 1932 as an engineering assistant. Later he was assigned to electrical and gas distribution work in the suburban area served by the company.

In 1942 he was promoted to the post of superintendent of the Barbadoes electric generating station near Norristown. He later served in the same capacity at the company's Delaware and Southwark stations. He was named assistant general superintendent



From the Beale Collection of Early Americana

Horseshoe Iron...to Aircraft Steel

Ryerson Completes 110 Years of Service

When Joseph Ryerson opened his first small iron store, 110 years ago, the clang of the blacksmith's anvil was a dominant note in America's metalworking industry. Blacksmiths, boiler makers and other metalworking pioneers were the iron store's first customers. Their orders for horseshoe and boiler iron, axles, plow steel, spikes, etc. formed the basis of our business.

Today that small iron store has grown to be the world's largest steel service organization with fifteen great plants strategically located across the nation.

On the occasion of our 110th Anniversary, we are grateful for our thousands of customers whose orders through the years testify to the Ryerson tradition of trustworthy service. And we are thankful for the privilege of living and working in a free country where initiative and service are rewarded.

From your nearby Ryerson steel plant flows every kind of steel in every shape and size to meet the needs of industry. Ryerson shipments cover everything from structural shapes and plates of carbon steel and bright sheets of stainless to high strength aircraft-quality alloys.

When you need steel, any kind, any quantity, cut to order and delivered promptly we will be pleased to have you call us.

PRINCIPAL PRODUCTS IN STOCK

CARBON STEEL BARS—Hot rolled and cold finished

STRUCTURALS—Channels, angles, beams, etc.

PLATES—Many types including Inland 4-Way Safety Plate

SHEETS—Hot and cold rolled, many types and coatings

TUBING—Seamless and welded, mechanical and boiler tubes

ALLOYS—Hot rolled, cold finished, heat treated. Tool steel.

STAINLESS—Allegheny bars, plates, sheets, tubes, etc.

REINFORCING STEEL—Bars and accessories, wire mesh, etc.

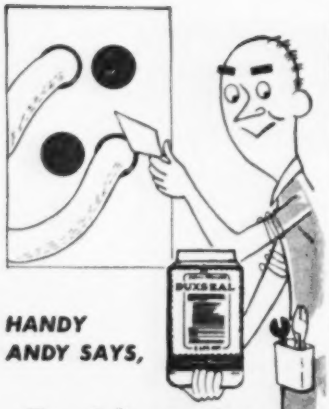
BABBIT METAL—Lead base.

RYERTEX—Plastic bearing.

MACHINERY & TOOLS—Metal fabrication

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE



HANDY ANDY SAYS,

Seal it Quick ...seal it Tight with Johns-Manville DUXSEAL

KEEP A PACKAGE of Duxseal in your tool box for on-the-spot sealing of duct openings, potheads, bushings, terminal boxes—and for filling multi-wire contact boxes indoors. It's a nonhardening adhesive plastic compound with an asbestos base . . . goes on like putty just as it comes from the handy package . . . provides a smooth, workmanlike job.

Check these 4 important advantages of Duxseal:

Stays plastic—Duxseal stays plastic indefinitely. Will not slump, melt or run under ordinary temperatures.

Stays tight—Clings to duct walls and cables but flexes with expansion and contraction of the cable.

Stays insoluble—Unaffected by ground waters and gases.

Stays harmless—Will not injure workmen's hands or react with rubber, metals or painted surfaces.

Tight seals for other electrical uses:

J-M Transoleal . . . for use against refined oils employed in transformers, switches and similar equipment.

J-M Uniseal . . . for caulking equipment outdoors or in fume-laden areas. Resists temperatures up to 180° F.

Let us send you more information about Duxseal and other J-M labor-saving sealing compounds. Just write Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay Street, Toronto, Ontario.

JM

Johns-Manville SEALING COMPOUNDS

of station operations in 1949, assistant manager of electric operations in 1950, and manager this year.

Liversidge is a member of Edison Electric Institute, Pennsylvania Electric Association, of which he is a member of the executive committee, American Gas Association, Pennsylvania Gas Association, American Society of Mechanical Engineers, and the American Society for Testing Materials.

E. R. KROPP

Union Electric Elects Kropp Vice President

E. R. Kropp has been named vice president of Union Electric Co of Missouri. Kropp, formerly assistant to the president, will take over general and administrative duties in his new post.

Kropp succeeds Charles E. Michel, who will serve as a special consultant to Union Electric.

With Union Electric since 1923, he has served in various capacities such as assistant to the secretary and as assistant secretary. After three and a half years in the Navy during World War II, he returned to the utility in 1945 as assistant secretary. Three years later Kropp was promoted to assistant to the president.

James M. Mead, formerly manager of the New York plant of Joseph T. Ryerson & Son, Inc, Chicago, has been appointed first assistant to Ainslie Y. Sawyer, vice president in charge of purchasing, procurement, and merchandising. Succeeding Mead at New York is **William O. Springer**, manager of the company's Cleveland

Thompson
FIRST NAME IN BRUSH KILLERS

REPORT: Winter Basal Bark Spraying

It is smart, economical management to control brush along utility rights-of-way by dormant basal bark spraying. This is true for all sections of the country. It is particularly recommended for cotton . . . tobacco . . . truck crop regions.

Successful, highly effective kills are obtained at low cost. In addition to the economy of the operation, often there is more efficient use of available manpower. Permits brush clearance along lines in fields where susceptible crops hinder summer spraying. Recommended, too, for spot clearance.

These benefits are proven not only by intensive research on Thompson experiment stations but by the field experience of many REA Co-ops, electric and telephone companies along hundreds of thousands of miles of line.

WHAT TO USE

For utmost economy and assurance of positive kills, we recommend our specially developed, modern low volatile brush killers:

BRAMBLCIDE
2, 4, 5-T

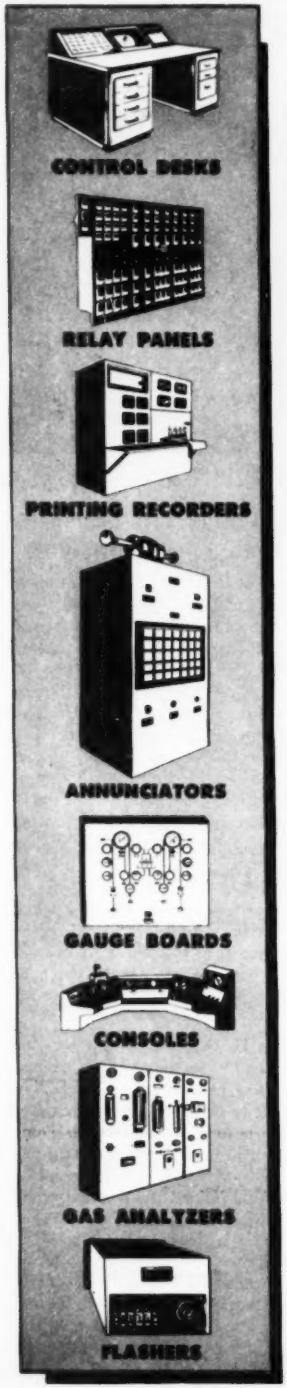
BRAMBLE-WEEDICIDE
2, 4, 5-T—2, 4-D

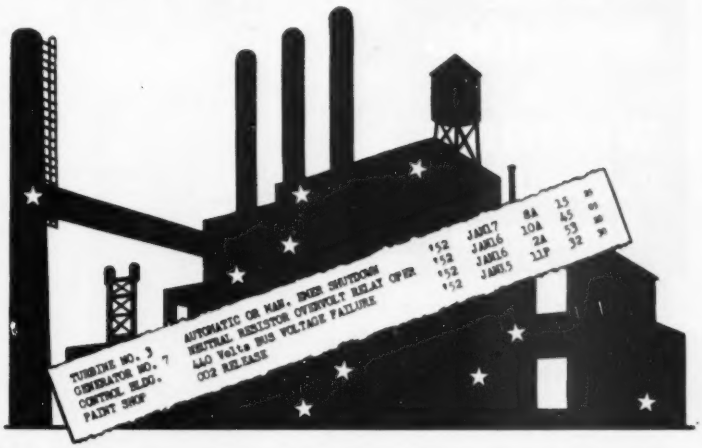
These brush killers are non toxic for humans or animals. They contain HS-31 for extra creep and extra kill. They are unmatched for efficiency and economy by any other known product.

Please write for data sheet on mixing and spraying and for price schedule.

Thompson
CHEMICALS CORP.
St. Louis 3, Missouri
Los Angeles 27, California

ENGINEERED EQUIPMENT FOR EFFECTIVE PLANT CONTROL





T&C *Sequential Recorder Annunciator*

the Automatic Brain that Observes, Reports, Records every deviation from normal operation!

Literally, it sees all—tells all! For this new T & C control equipment keeps a constant watchful eye on as many as 500 separate plant operations—*instantly reporting* any irregularity or change in operating conditions with an audible, visible warning—and *automatically recording* the time, place and description of every change, in exact sequence of occurrence, even when changes occur within milliseconds!

By collecting and collating information from each monitored point, the relay panels actuate the annunciator and recorder. These are mounted on the top of the control desk, bringing complete annunciation recording directly before the operator. In a continuous permanent record, you have an automatic log of your entire operation. You are warned of danger as it happens—in time to forestall serious damage. You are saved hours of searching for the origin of trouble—minimizing production curtailment. You have a clear printed picture, in detail, of everything that happens throughout your plant—an automatic record of what happened, where and when, and the sequence in which it happened.

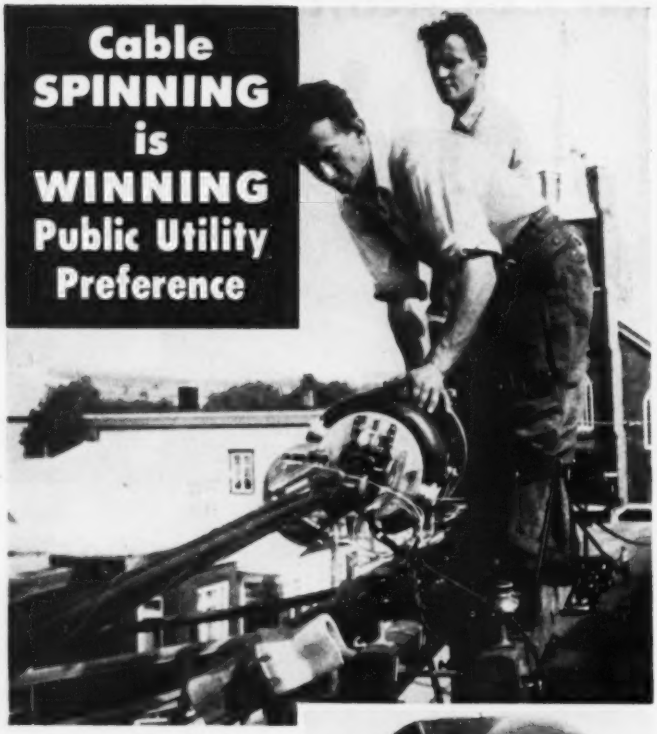
Yet the T & C Sequential Recorder-Annunciator costs only slightly more to install and maintain than an ordinary annunciator system.

TALLER & COOPER, INC.
Engineers-Manufacturers
75 FRONT STREET • BROOKLYN 1, N. Y.

TOLL COLLECTION SYSTEMS—TOLL BOOTHS
POWER CONTROL EQUIPMENT—DIGITAL COMPUTERS
WIND TUNNEL INSTRUMENTATION—SPECIAL PURPOSE INSTRUMENTATION

SEE SARA T & C's Sequential Automatic Recorder Annunciator at Booth 466, 20th National Power Show, Grand Central Palace, N. Y., Dec. 1-6.

Cable SPINNING is WINNING Public Utility Preference



More and more public utilities every day are turning to the Neale Model "K" Cable Spinner—specially designed for economical and efficient power line use. And here are some of the benefits . . .

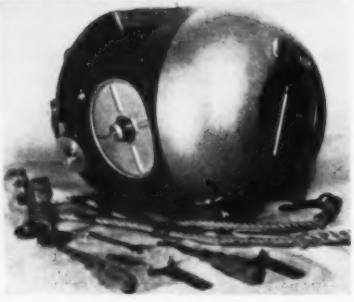
It actually costs much less to install spun cable than pre-assembled cable. And, of course, spun cable saves valuable space in open-wire construction in congested areas.

Light weight single conductor cables may be spun in lengths three times as long as pre-assembled cables . . . to save splices and installation labor.

Spinning reduces cable inventories, because 1/c, 2/c and 3/c cables can be spun in the field as required.

Cable spinning provides a big margin of extra protection against storm damage . . . and has proved invaluable in emergencies of all kinds.

You're invited to send for full technical details on the Neale Model "K". Just drop a line to Cable Spinning, Topeka. *Neale Spinning Wires available in seven different types and sizes.*



Main illustration shows spinning of cable in Canada. Inset is close-up of the Neale Model "K" Cable Spinner, with accessory tools. Model "K" spins a single cable or three 2" cables into a compact triangular pattern. Strand lies in groove formed by two top cables.

HOW IT WORKS. Drum rotates when its two friction drive wheels respond to pulling of wire. Drum revolves once when 13' of wire is pulled — regardless of condition of strand. Drum carries two spools of wire, spaced to spiral 6½" apart for ample cable support. Magnesium castings used wherever possible for lightness and strength. Weight is only 36 pounds. Length 18½", 12" diameter, 4¾" wire exit.

THE WORLD IS SPINNING—TOO!

Cable Spinning Equipment Co.

3100 TOPEKA AVE. TOPEKA, KANSAS

plant since 1945. Springer's former Cleveland post has been filled by **John W. Queen,** Alloy Steel Division manager at Chicago.

THEODORE H. BUTLER

NEES Transfers Butler to Worcester Utility Post

Theodore H. Butler has been transferred from the vice presidency and managership of Northampton (Mass.) Electric Lighting Co to the post of executive assistant to Pres Alfred W. Smith of Worcester County Electric Co. Both utilities are subsidiaries of New England Electric System.

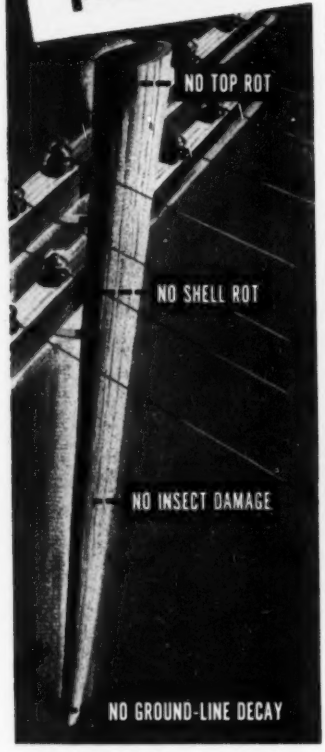
Butler joined the New England power system in 1928. Later he was engaged in system engineering work in Boston and Lawrence, Mass., and Burlington, Vt., with Green Mountain Power Corp, formerly a NEES subsidiary.

After four years with the Civil Engineering Corps of the Navy, he was discharged with the rank of lieutenant commander. He has been at Northampton since 1949.

William H. Dunham, an attorney for New England Public Service Co since 1939, has been appointed executive assistant to Central Maine Power Co, an affiliate of New England PS. Dunham will work with the operating departments and will assume responsibility for administration of the company's wage policies.

B. M. Kirsch has retired as vice president in charge of sales for Pennsylvania Electric Co because of ill health. Kirsch, who has been on leave of absence since March, was named vice president in 1946. He joined Pennsyl-

Penta gives CLEAN protection



The clean way to safeguard poles, crossarms and other wood construction is the PENTA way. This chemical formula is always the same—deep-penetrating, powerful, long-lasting. PENTA-treated poles last years longer, cost less to maintain . . . and they're *clean*. Write today for names of companies near you supplying PENTA-treated wood products.

CHAPMAN CHEMICAL COMPANY

Dermon Building, Memphis 3, Tenn.

CHAPMAN®

Penta Preservative

Conforming to A.W.P.A. Specification P8 and P9

ONAN Auxiliary Electric Plants

Keep customers happy when power's off!

Servicing sometimes requires that highline power be temporarily interrupted. Or storms, floods or fires may cut power to a factory, business or farm and cause severe losses.

To maintain and build customer goodwill in situations like these, many power companies use Onan Electric Plants as temporary sources of electricity. Mounted on truck or trailer they are rushed to the spot, hooked up and operating within a short time.

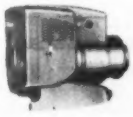
Onan Electric Plants are built for heavy-duty use to run continuously if necessary. They are trouble-free and economical to operate.

Having several sizes available is most economical since you can fit plant capacity to the electrical load. Onan gasoline-powered plants range from 1,000 to 35,000 watts. Diesel-powered: 3,000 to 55,000 watts.

A SIZE AND MODEL TO FIT ANY JOB

Model 10EL—10,000 Watts. Similar models to 35KW

Model 5GO—5,000 Watts. 4-cylinder heavy-duty engine



Model 305CK—3,500 Watts. 2-cylinder, air-cooled, engine

Write for specifications

Onan ELECTRIC PLANTS

D. W. ONAN & SONS INC.

5432 University Avenue Southeast — Minneapolis 14, Minnesota

Keep Terminal Connections Tight
with
PALNUT
TRADE MARK
LOCK NUTS

- ***Perfect Conductivity***
- ***No heating or corroding of contact surfaces***
- ***Easy, speedy assembly***

PALNUTS apply on TOP of the regular nuts, holding them to original tightness. Spring washers are eliminated between nut and terminal lug. There can be no backing off of nuts nor opened spring washers to reduce contact. Instead, full conductivity of the entire nut seat is maintained under severest vibration.

Double-locking PALNUTS are single thread locknuts, made of tempered spring steel or silicon bronze. They are easily, quickly spun on with the fingers and locked with 1/3 turn of a wrench. Require only 3 bolt threads space, are light in weight, low in cost, may be re-used.

PALNUTS are available from stock for every utility requirement. Write for PALNUT Bulletin #577, giving full details.

The PALNUT Co.
CONDIER ST. IRVINGTON 11 N. J.

vania Electric and its subsidiaries in 1941 after serving with Niagara Mohawk Power Corp and Westinghouse Electric Corp.

C. Robert Maranville, formerly assistant to the works manager of the Holyoke, Mass., plant of Worthington Corp, Harrison, N. J., has been named assistant treasurer of the corporation. Maranville has been associated with Worthington for the past 16 years.

Victor Welge has joined P. R. Mallory & Co. Inc, Indianapolis, as associate director of engineering. Welge came to Mallory from Consolidated Vultee Aircraft Corp, San Diego. In his new post Welge will be concerned with electric, electronic, and mechanical engineering problems in Mallory's central engineering department.

Samuel Horelick will retire Nov. 19 as chairman of the board of Pennsylvania Transformer Co. Horelick was elected to this post in 1949 after serving as president of the company for 20 years. The retiring official helped to establish Pennsylvania Transformer in 1929.

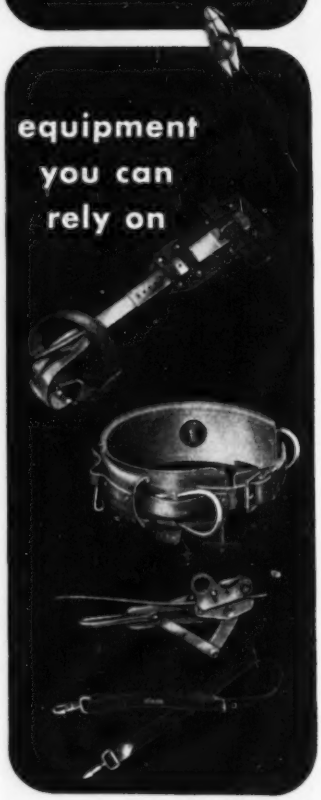
Harold B. Donley has been appointed general manager of General Electric Co's newly established specialty refrigeration products department in the Major Appliance Division. Donley, formerly general manager of the discontinued room cooler department, joined GE in 1948.

William A. Whittlesey II, has retired as vice president of Western Massachusetts Electric Co. Whittlesey, however, will remain as a vice president and trustee of the parent company, Western Massachusetts Companies, and as a director of Western Massachusetts Electric.

Lionel B. Hakes, who has been associated with Nash-Kelvinator Corp for the past ten years, has joined Pierce Governor Co, Inc, Anderson, Ind., as vice president in charge of sales. Hakes served Nash-Kelvinator as zone manager in the Cincinnati, Chicago, and New York zones.

W. A. Halvorson, Devils Lake (Minn.) district manager for Otter Tail Power Co, has been named Devils Lake Division manager to succeed **R. W. Dyson,** who has retired. Halvorson, who joined Otter Tail Power in 1925,

KLEIN



Talk to any old-timer on the job and he'll tell you Klein equipment is his choice for comfort—for safety—for service. Look for the familiar Klein trade-mark on pliers, safety straps and belts, climbers, grips and wrenches. Klein has been serving the electrical industry "Since 1857."

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York

Write for your free copy of the Klein Pocket Tool Guide today!

"Since 1857"

Mathias Klein & Sons
(Established 1857) Chicago, Ill. U.S.A.
3200 BELMONT AVE., CHICAGO 18, ILL.

has filled the district manager's post since 1949. Dyson, who entered the utility field 42 years ago, went to Otter Tail Power when the utility started serving the Devils Lake area in 1925.

Jack Siegrist has been named to the newly created position of national advertising manager of Motorola, Inc. Siegrist was formerly advertising and sales promotion manager of Admiral Corp, New York.

Charles W. Nulle has been appointed advertising manager of the Lighting Division of Sylvania Electric Products, Inc. He will make his headquarters in New York. Before joining Sylvania, Nulle for two years was advertising manager of the Coated Products Division of Interchemical Corp, New York.

OBITUARY

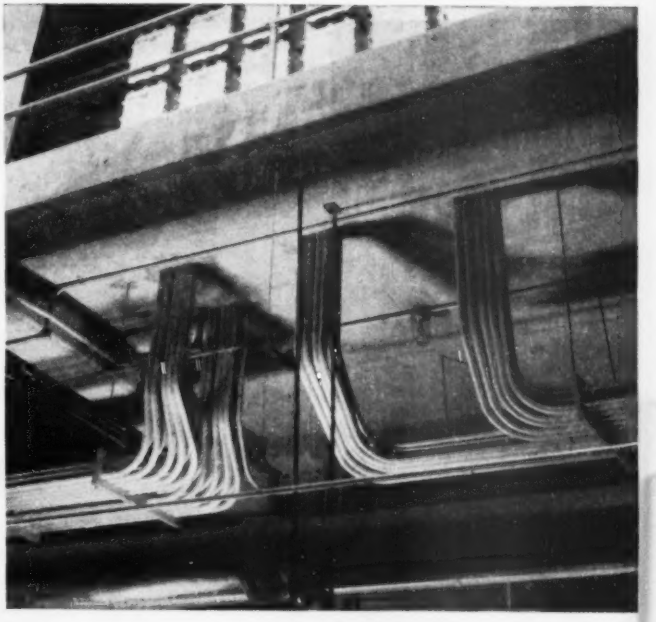
Chester A. Bingham

Chester Arthur Bingham, 68, an executive of Alabama Power Co, died Nov. 1 at Birmingham.

Bingham had been vice president and treasurer of Alabama Power since 1942. This September he resigned as treasurer, but continued as vice president.

He first became associated with the utility in 1912 when he assisted in title work in connection with the construction of Lay Dam. He joined the company's legal staff in 1916.

Bingham served from 1926 to 1930 as treasurer of Southeastern Power & Light Co, a predecessor of Commonwealth & Southern Corp. In 1940 he was elected treasurer of Alabama Power, which was owned by South-



½" to 3" aluminum conduit used in
Cleveland's Easterly Sewage Disposal Plant

Solves Costly Conduit Corrosion Problem!

The corrosive conditions common in sewage treatment plants usually result in high maintenance costs or frequent replacement of metallic conduits. The engineers in charge of the electrical installation in Cleveland's Easterly Sewage Disposal Plant found an economical solution to the problem. They specified aluminum electrical rigid conduit; the lowest cost corrosion-resistant conduit available.

Weighing only a third as much as steel, it is easily handled on the job site.

For complete information on Alcoa Aluminum Electrical Rigid Conduit, call the Alcoa sales office listed under "Aluminum" in your classified directory or write for our new conduit booklet.

ALUMINUM COMPANY OF AMERICA
1936-Y Gulf Building
Pittsburgh, Pennsylvania

ALCOA

ALUMINUM RIGID CONDUIT

Only PLUGMOLD 2000 gives you SWITCHED and HOT OUTLETS in the SAME Receptacle!

WIREMOLD's exclusive SNAPICOIL eliminates multiple connections between short lengths – receptacles are pre-wired in 50 foot coils.

The Snapicoil 3-wire duplex receptacles of the new Plugmold 2000 multi-outlet system have one side *switched* and one side "*hot*"—this exclusive Plugmold feature means *extra* convenience in homes, stores, offices . . . everywhere.

The same size Plugmold 2000 raceway also accepts Snapicoil 2-wire duplex all "hot" or NEMA 2-wire grounded receptacles. Only *one size raceway* is needed on the job!

Plugmold 2000 is easier, faster and cheaper to install!

Write today for the new, free Plugmold 2000 book!

PLUGMOLD 2000

WIREMOLD'S *New* multi-outlet system

THE WIREMOLD COMPANY
Hartford 10, Connecticut

eastern P&L. Two years later he became the company's vice president and treasurer.

Frank E. Watts

Frank E. Watts, 74, recently retired assistant to the president of "Farm Journal," died Oct. 28 at Dunedin, Fla.

A well known figure in the electrical industry for nearly 50 years, Watts was identified in later years in the promotion of farm electrification. An Edison Electric Institute award in that field known as the Frank E. Watts Award, was established last year by his publication.

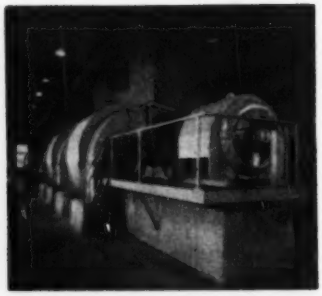
Born in Sunbury, Ohio, Watts entered the electrical industry in 1905 as a machinery salesman. Then he sold incandescent lamps for Western Electric Co. and in 1913 joined the sales staff of Electrical World.

In addition to serving as editor of both "Electrical Record" and "Electrical Dealer," Watts was one of the founders of the Bennett-Watts-Haywood Co, former publishers of "Electric Light & Power." He joined "Farm Journal" in 1914.

William W. Edson, 56, head of station electrical design for Boston Edison Co, died at Auburndale, Mass., Nov. 2. Edson, who had been with the utility for 27 years, had served in 1943 as chairman of the Electrical Equipment Committee of New England.

George R. Hilty, 79, formerly advertising manager for Florida Power & Light Co, died Oct. 14 at Alexandria, Va. Hilty, who made his residence at Sebring, Fla., had worked in the utility's Miami office.

Low Cost KILOWATTS IN PRODUCTION



A battery of large size "Buffalo" Double Inlet Induced Draft Fans in a large eastern power station.

"Buffalo" DRAFT FANS on the JOB

Efficient draft is half the battle in lowering the cost of power production, and many a firm has won this battle by installing "Buffalo" Draft Fans. First, because they are efficient—save on driving power. Second, because they are long-lived on industry's most severe fan job. For instance, the "Buffalo" Induced Draft Fans shown above are handling a continuous storm of hot, abrasive fly-ash. "Buffalo" Draft Fans are built for endurance. Housings and rotors are heavy steel plate. Shafts and bearings are oversize. And all parts are accessible for inspection and servicing. Why not write now for Bulletin 3750 and see the full line of "Buffalo" Draft Fans that are cutting power costs by reducing time-out for maintenance and repair.

BUFFALO FORGE COMPANY
212 Mortimer St. Buffalo, New York
Publishers of "Fan Engineering" Handbook
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
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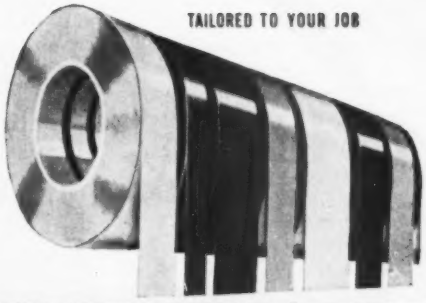
"Buffalo" FIRST FOR FANS 75th

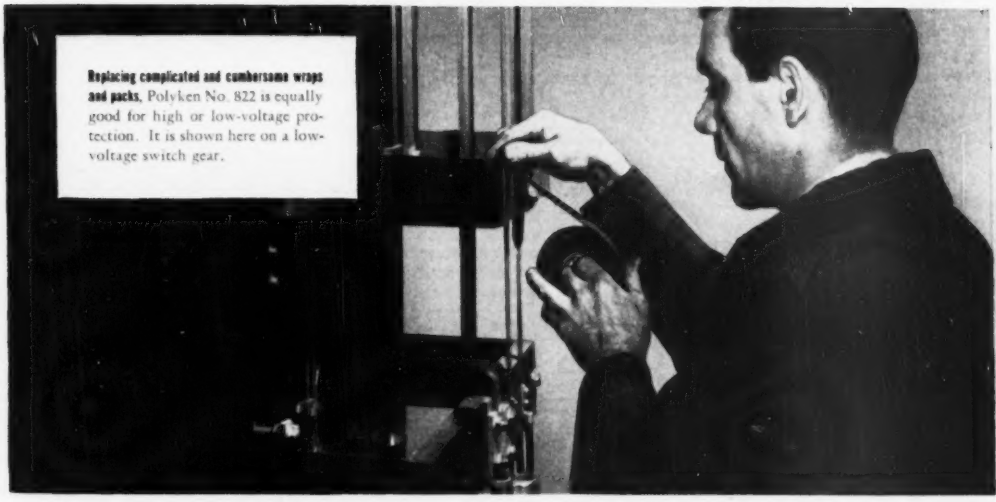
THE NEW

Polyken®

INDUSTRIAL TAPES

TAILORED TO YOUR JOB





Replacing complicated and cumbersome wraps and packs, Polyken No. 822 is equally good for high or low-voltage protection. It is shown here on a low-voltage switch gear.

One tape replaces all packs, wraps and compounds

A remarkable improvement has been made in insulating materials. The new Polyken Tape No. 822 does the whole job by itself. No packs, wraps or compounds are needed. Your insulation takes only half as long to apply.

- Polyken No. 822 is the only successfully oriented polyethylene tape with a pressure-sensitive adhesive.
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You'll find No. 822 ideal for splicing, wrapping, insulating or corrosion coating of wires, switches, controls, conduits, dozens of different uses. And No. 822 is only one of more than 100 Polyken Tapes made to save you time and money. Send in the coupon today for free samples and booklet!

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Polyken, Dept. EWL, 222 West Adams St., Chicago 6, Ill.

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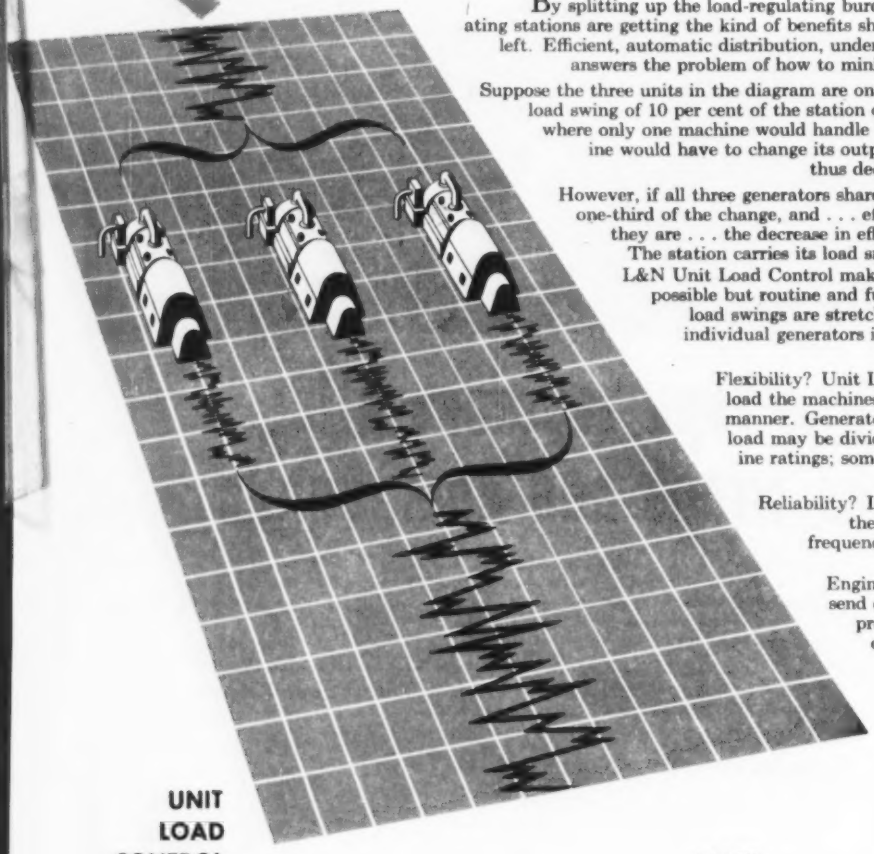
TO MAKE BIG LOAD CHANGES LOOK SMALL

- *Distribute station load changes...*
- *Among any number of operating units...*
- *To provide a regulated incremental output*



UNIT LOAD CONTROL

By splitting up the load-regulating burden, more and more generating stations are getting the kind of benefits shown in the diagram at the left. Efficient, automatic distribution, under L&N Unit Load Control, answers the problem of how to minimize the effects of swings.

Suppose the three units in the diagram are on the line, when a customer load swing of 10 per cent of the station output develops. In plants where only one machine would handle the regulation, that machine would have to change its output very substantially, and thus decrease the unit's efficiency.

However, if all three generators share the swing, each gets only one-third of the change, and . . . efficiency curves being what they are . . . the decrease in efficiency is sharply reduced. The station carries its load smoothly and economically. L&N Unit Load Control makes such operation not only possible but routine and fully automatic. Short-time load swings are stretched so thin that loading of individual generators is practically unaffected by fringe variations.

Flexibility? Unit Load Control lets operators load the machines in practically any desired manner. Generators may be loaded equally; load may be divided in proportion to machine ratings; some units may hold base load while others regulate.

Reliability? L&N equipment now solves the great majority of all load-frequency control problems for the power industry.

Engineering? You are invited to send details of your load-control problem to our nearest office, or to 4938 Stenton Avenue, Phila. 44, Pa.

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Jrl. Ad ND4-56-461(9a)

HERE IS AN INTERIOR VIEW of General Electric's Western "Appliance Train," which made its first stop on a nationwide tour in Chicago. Kenneth Roe of GE's Major Appliance Division describes features of a new 1953 model refrigerator to members of distributor organizations from Chicago, Milwaukee, and South Bend, Ind. The train is one of two touring the country

GE Major Appliance Trains . . .

. . . are used to introduce 1953 models to nation's distributors. Baggage cars are converted into display rooms

This month General Electric Co will use for the first time "exhibit halls on wheels" to introduce its 1953 line of major appliances to key distributor personnel throughout the nation.

To make the nationwide tour, GE has a Western Train and an Eastern Train making stops at major cities. GE's trains will be attached to a regular passenger train for movement from city to city. Each will travel, over tracks of 21 different railroads.

Display Rooms on Wheels . . . Each "Appliance Train" consists of three baggage cars converted into display rooms and a pullman car to accommodate company personnel. Each baggage car is subdivided by a revolving demonstration platform to facilitate presentation of the appliances. To permit clear viewing, chairs are set up in two tiers in the larger section of the car. Appliances are displayed on platforms on either side of the car at the other end. Car exteriors are marked "General Electric Major Appliance Train."

Itinerary . . . Today the Western Appliance Train will visit Portland, Ore. Then the GE "special" is scheduled to stop at San Francisco Nov. 20 and Los Angeles Nov. 24. To date, this train has made stops at Chicago, St. Paul, Kansas City, and Salt Lake City.

The Eastern Appliance Train will roll into Raleigh today and will stop at New Orleans Nov. 21 and Dallas Nov. 24. The Eastern train has visited Cleveland, Boston, New York, Philadelphia, and Washington, D. C.

Both the Western and Eastern trains left the company's Major Appliance Division headquarters at Louisville, Ky., on Nov. 4.

Westinghouse's Sales Soar to Record High

Westinghouse Electric Corp's sales were the highest on record for any nine months and in the third quarter for any three months.

Sales for the first three quarters of 1952 were $1,043,861,000, an increase of 15.9% over sales of $901,042,000 in the first nine months of 1951. Sales for the third quarter totaled $362,483,000, an increase of 16.7% over third quarter sales of $310,480,000 in 1951. Highest previous sales in any quarter amounted to $357,558,000 in the second quarter of 1952.

Westinghouse's net income for nine months of 1952 rose 14% over the same period of 1951, while for the third quarter the increase was 54% over the third quarter of 1951.

Net income for nine months was $48,741,000, equal to $3.02 per share of common stock, compared with $42,756,000, equal to $2.67 per common share, in the like period of 1951.

For the third quarter of 1952, net income was $17,233,000, equal to $1.07 per common share, compared with $11,193,000, equal to 69¢ per common share, in the corresponding period of 1951.

Research Lab . . .

. . . is established by Walter Kidde Nuclear Laboratories. Long Island unit to employ 100

Walter Kidde Nuclear Laboratories has established a new research and development laboratory on Long Island, N. Y., near Garden City. The Laboratories is the first privately financed research organization devoted primarily to the development of atomic power for commercial and industrial purposes. The laboratory will serve as headquarters for the New York firm's operations.

Work Started . . . Research operations have been started at the laboratory, although the installation of certain specialized equipment needed to carry on nuclear research and development projects will continue for several months.

To carry on operations, a staff of 40 is required at the start and consists primarily of physicists, chemists, engineers, mathematicians, laboratory technicians, and clerical personnel. A minimum staff of 100 will be required when the laboratory is in full operation within the next six to 12 months.

The new laboratory, which has been under construction since late spring, is a brick structure of modern design with laboratory areas devoted to chemistry, physics, metallurgy, radiochemistry, and materials testing.

Shop areas will be set up for carpentry, welding, glass blowing, and machine shop uses. A general engineering department, photographic

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GENERAL ELECTRIC

603-84

darkroom, library, and administrative staff will also be housed in the new structure. Flexible layout of the building interior permits rapid expansion of specific laboratory facilities and the installation of special equipment when necessary for research and experimentation projects.

Objectives . . . The Laboratories was organized to carry out three objectives.

First is the development of commercial atomic power with particular emphasis on original research and development in the field of low-cost nuclear reactors.

Second is cooperation with government agencies and their contractors and subcontractors in the development and design of atomic facilities.

Third object set up by Walter Kidde Nuclear Laboratories is collaboration with private industrial organizations, laboratories, and others interested in the application of the nuclear sciences to specific problems.

SALES ASSIGNMENTS

COMPANY STAFFS

Allis-Chalmers Manufacturing Co. Milwaukee, has appointed J. E. Watson representative in charge of its Miami office, which has been made a branch of the Tampa district under the supervision of E. T. Cuddeback, manager of the Florida district. Miami was formerly a district office under the management of Joseph Bronaugh, who was recently named manager of the Cleveland district office to succeed Robert L. Halsted. Halsted recently was made manager of A-C's central region with headquarters in Cleveland.

Electric Controller & Manufacturing Co, Cleveland, has placed O. J. Archer in charge of its newly opened office in the Washington (D. C.) area. The new office is located at 8616 Georgia Ave., Silver Spring, Md.

BullDog Electric Products Co. Detroit, has appointed John J. Carr to its Philadelphia sales force. Carr will be responsible for the sale and promotion of Vacu-Break master safety switches, Universal Trol-E-Duct and Pushmatic Electric-Centers in the Philadelphia district. He will make his headquarters in Wilford Bldg., 33rd and Arch Streets, Philadelphia.

Libbey-Owens-Ford Glass Co's Fiber Glass Division has named Ralph G. Cox as field sales representative in the Charlotte, N. C., area. Cox, formerly with Duke Power Co, will have offices at 319-322 Professional Bldg., 403 North Tryon St., Charlotte.

Mitchell Manufacturing Co, Chicago, has named William I. Crockett Wisconsin district sales manager of its Commercial and Industrial Fluorescent Lighting Division. Crockett joined Mitchell three years ago as lighting sales engineer.

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Strong...
to support pole structures under adverse ice and wind loadings.

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to withstand the punishment incurred in construction and service.

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REINFORCE and PROTECT YOUR CONDUCTORS with Preformed ARMOR RODS

Minimize wear and chafing . . . Absorb and dissipate vibration . . . Protect against arcing and flash-overs . . . Increase holding power against slippage . . . Lessen possibilities of corrosion . . . *Reduce overall maintenance costs.*

Contact your jobber of *Crapo* Galvanized Products or write direct for further information!

INDIANA
STEEL & WIRE COMPANY
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MAJOR JOBS FOR QUALIFIED, YOUNG, AMBITIOUS UTILITY PERSONNEL

We have been authorized to present fully qualified candidates for the following positions:

1. **ADMINISTRATIVE VICE PRESIDENT** in 38-45 year age bracket. Qualified to coordinate operating, commercial, and accounting functions and administer company's organization and operations. Operating and/or engineering experience essential. Familiarity with rate case preparation and presentation, accounting, and sales promotion desirable. Preferred consideration given to those with combination experience, such as electric-gas, telephone-gas, electric-water, telephone-water. Eastern location.
   Starting salary range (dependent on qualifications) . . . $13,500-$20,000

2. **VICE PRESIDENT, OPERATIONS,** in 38-45 year age bracket. Qualified to assume full, final responsibility for operations, engineering, and construction. Operating and engineering experience absolute requirement; familiarity with rate analysis, labor negotiations, analysis of manpower requirements desirable. Sufficient experience, knowledge and background to handle all operating and engineering problems of diversified utilities company. Multi-utility experience essential, such as combination electric-gas, telephone-water, etc. Eastern location.
   Starting salary range (dependent on qualifications) . . . $12,000-$15,000

3. **TREASURER** in 35-40 year age bracket. Qualified to supervise and administer all accounting and quasi-accounting, commercial problems. Experience in utility accounting, including familiarity with F.P.C. and F.C.C. systems, and also in utility financial budgeting and use of budgetary methods for control, essential. Knowledge of systems and methods development and rate case preparation desirable. Eastern location.
   Starting salary range (dependent on qualifications) . . . $10,000-$12,500

4. **GENERAL SALES MANAGER** in 35-45 year age bracket. Qualified to direct, from a central administrative office, sales and load building program for geographically separated electric, gas, and telephone properties. Experience in actual selling and in building of sales forces absolute requirement. Familiarity with technical bases for competitive selling desirable. Eastern location.
   Starting salary range (dependent on qualifications) . . . . . $5,000, plus commission arrangement

Each of the above jobs is with an organization whose fundamental policy is aggressive, efficient and productive business management. General requirements are that applicants must be ambitious, hard working, and interested in a productive association, rather than in only the security of a "civil service" type position.

Successful candidates will have the philosophy that continuing personal benefit and advancement can only result from continuing achievement on behalf of the organization.

Starting salaries within the above ranges will depend upon how closely applicants meet the ideal specifications. Engagements will be premised on improvement in compensation within one year from association, if productive job is done. Pension and insurance benefits are at least competitive.

These jobs are *not* for the chronically discontent. They *are* for those who rebel against advancement based only on seniority or years of service. They *are* for those qualified in the belief that they can really achieve and want to be compensated only for their achievement. They will appeal to those whose personal development or advancement has been stymied by contrary policy. They will be for those who want the challenge —and opportunity—of responsibility.

Consideration will be given *only* to those submitting detailed history of personal experience and qualifications, which should include present compensation and compensation in all previous positions.

Applications should also include concrete reasons for a desire to change from present affiliation. Picture optional on application.

All applications for each position will be treated in complete confidence. Those really qualified will be promptly advised of interview arrangements.

In each instance, appropriate employees have been advised of these openings.

The organizations involved are growing at a rate much faster than the average for the industries. The opportunity to combine "workability" with "livability" is unusual at the proposed locations.

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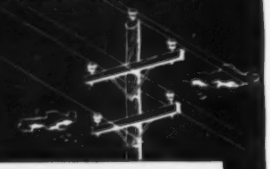

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New Electrical Construction

New electrical construction projects announced by private and government utility systems involving more than $70,000. Also listed are major industrial and construction jobs where electrical work is included.

UTILITIES

Proposed Construction

Ala., Gorgas—Alabama Power Co., 600 N. 18 St., Birmingham, addn. power generating unit, $25,000,000.

Arizona—Bureau Reclamation Dpt. Interior, Phoenix one 34.5-kv. bay addition to Yuma sub-station and relocating station service transformer, Davis Dam Proj. Spec. 300C-45. Extended date.

Ark., Paragould—City, imprv. in city's generating and electrical distributing system, $400,000. J. E. Flanders Co., Jefferson City, Mo., consult. engrs.

Fla., Eglin Air Force Base—U. S. Eng., P.O. Box 1169, Mobile, 7, Ala., electronic facilities, Eng 01-076-53-30. Plans deposit $25.

Ind., Jasper—City, Mayor Edward J. Lorey, imprv., electric plant, $2,500,000. Stanley Eng. Co., Muscatine, Ia., consult. engr.

Ind., Madison—Indiana-Kentucky Electric Corp., c/o P. Spon, pres. American Gas & Electric Co., 30 Church St., New York 8, N. Y., 1,200,000 kw generating plant. Site selected. $280,000,000.

Mich., Detroit—City, Bd. Health, R. L. Novy, MD, pres., 334 Bates St., electrical service lines, 7 and 8 Mile Roads, poles, primary and service lines to power house, Maybury Sanatorium, Contr. BH 24H. Plans deposit $5, refundable, George R. Thompson, city engr.

Mich., Northville—State, A. N. Langius, dir. State Bldg. Dpt., Lansing, power unit, steam turbine driven electric generation unit, alterations, imprvs., Northville State Hospital, E. R. Little Co., 1806 Kales Bldg., Detroit, engr.

Mo., Kansas City—Kansas City Power & Light Co., c/o J. A. Keeth, mgr., 1330 Baltimore St., Kansas City 10, Mo., plans by Ebasco Services, Inc., 2 Rector St., New York, N. Y., Unit 4 Hawthorne Station, $15,000,000.

North Carolina — Carteret-Craven Electric Membership Corp., Morehead City, line extens., sys. imprv., office, Carteret Co. $635,000.

Pa., Harrisburg — WABX, Inc., 111 Blackberry St., television station, $299,000. H. O. Bishop, 2638 Lexington St., consult. engr.

Pa., Pittsburgh — WWSW, Inc., Hotel Sheraton, television station, $547,000. Henry R. Kaiser, c/o owner, consult. engr.

Texas—LaRural Electric Co., Ennis, 18 mi. 24.5 KV single pole transmission lines at Ennis. $100,000. F. E. Woodruff, 407 Danciger bldg., Fort Worth, consult. engr.

Tex., Lubbock—Bryan Radio & Television, Inc., c/o Joe H. Bryant, 1803 Broadway, Lubbock, Tex., television station. Approx. $300,000.

Tex., Odessa—Odessa Television Co., Mercantile Securities Bldg., Dallas, television station, $205,000. Guy C. Hutcheson, Arlington, consult. engr.

Tex., San Antonio—Radio Station, c/o Manuel D. Leal, 3122 N. St. Marys St., radio transmitter bldg. and 200 ft. tower, $100,000.

Tex., Weslaco—Taylor Radio & Television Corp. (KRGV) 201 Border St., television station, $401,000. A. Earl Collum, Jr., 4710 Lemmon Ave., Dalls, consult. engrs.

W. Va., Clarksburg—Ohio Valley Broadcasting Corp. (WBLK) 211 5 St., Parkersburg, television station, $312,000. Vilah G. Brooks, Parkersburg, consult. engr.

Wis., Superior—Ridson Inc. (WDSM), 921 Tower Ave., television station, $406,000, John M. Sherman, 5240 Clinton Ave., Minneapolis, Minn., consult. engr.

Wyoming—Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver, Colo. furnishing and del. f.o.b. cars at shipping point or f.o.b. Casper, distribution boards, control cabinets, distribution transformers, for Alcova Power

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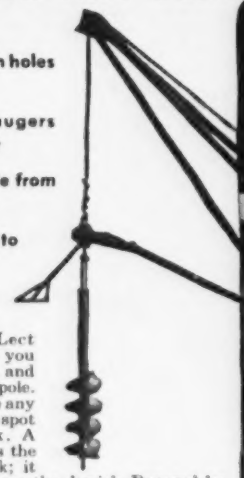

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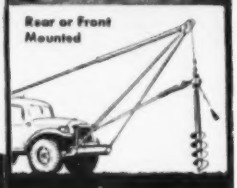

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Plant, Kendrick Proj. Spec. DS 3830. L. N. McClellan, ch. engr.

Low Bidders & Contracts Awarded

Arizona—General Electric Co., 650 17 St., Denver, Colo., CA, $152,221, Schedules 2 and 4, capacitor equipments with spare parts, lightning arresters for Phoenix Sub-station, Davis Dam Proj., Spec. DS 3742. Bureau Reclamation, Dpt. Interior, Bldg. 1A Denver Federal Center, Denver, Colo. Bids Sept 4, awarded Oct. 17.

N. J., Fort Dix—Robert E. Lamb & Son, Inc., 3429 W. Indian Ave., Phila., Pa., LB $476,430, boiler plant electric sub-stations and site imprvs., Inv ENG 36-109-53-12. U. S. Eng., 121 N. Broad St., Phila., Pa. Bids Oct. 23.

N. C., Asheville—C. M. Guest & Sons, Greensboro, N. C. CA. Approx. $200,000. electrical apparatus mfg. plant. Bibco Corp., c/o Biberstein, Bowles & Beacham, archts., 1600 Elizabeth Ave., Charlotte, N. C.

South Carolina—F. J. Seastrunk, Columbia, S. C. $169,218. Proj. SC 37, sub-stations, Lexington Mid-Carolina Electric Co-operative, Inc., Lexington, N. C. McCall-Thomas Eng. Co., Inc., Orangeburg, S. C., engr. Bids Oct. 15.

Texas—Victoria County Electric Co-operative, Victoria, Tex. Force Account. $95,000, some rural distr. lines and sys. imprvs., Victoria. Robert M. Stein, Victoria, Tex., engr.

Tex., Dallas—Dallas Power & Light Co., Dallas Power & Light Bldg., Dallas, Tex., Own Forces, $98,300, addnl. electric transformer unit at Westmoreland Sub-station.

Tex., Roma—Bechtel Corp., 220 Bush St., San Francisco, Calif. LB $512,463. switchyard and appurtenant works for completion Falcon Power Plant, Falcon Dam, Spec. D-4700. International Boundary & Water Comn., United States and Mexico, Box 1859, El Paso, Tex. Bids Oct. 24.

Alaska — Pacific Alaska Contractors, Inc., 2907 "A" St., Tacoma, Wash., CA, $714,300, director finder station, Spec. 31608, Cape Chiniak, 17th Naval Dist., Kodiak, Alaska. Bids Oct. 22.

INDUSTRIAL, COMMERCIAL & PUBLIC BUILDINGS

Proposed Construction

Calif., Los Angeles—City, City Hall, 8 story, rein.-con. police facilities bldg. $5,000,000. Plans deposit $150. Murray Erick & Assocs. and Paul Jeffers, 5657 Wilshire Blvd., Los Angeles, engrs. Welton Becket & Assocs., and J. E. Staunton, 5657 Wilshire Blvd., Los Angeles, archts.

Md., Camp Detrick—U. S. Eng., First and Douglas Sts. N.W., Wash., D. C., 3 laboratory bldgs. $7,000,000. H. K. Ferguson Co., Frederick, engrs.-archts.

Mich., Ann Arbor—University of Michigan, Harlan Hatcher, pres., Ann Arbor, 3 brick, steel, stone library bldgs. on campus, $3,250,000; first unit medical science, $1,800,000; brick, steel, stone music bldg., $1,200,000; brick, steel fire station and training center, $320,000.

Minn., Minneapolis—Prudential Insurance Co. of America, Rand Tower, plans by Magney, Tusler & Setter, 202 Foshay Tower, regional office, 8 story central tower with 3 story wings, near France Ave. and Wayzata Blvd. $6,000,000.

O., Cleveland—Bd. Trustees Fairview Park Hospital, 3395 Franklin Blvd., plans by Garfield, Harris, Robinson & Schafer, 1740 E. 12 St., 5 story, 200-bed brick, stone hospital, Lorain Ave. at Rocky River Valley. $4,750,000.

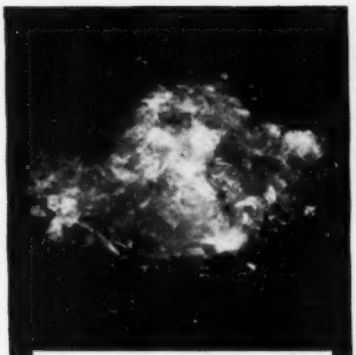
Pa., Brackenridge—Allegheny Ludlum Steel Corp., Brackenridge, 1 story, steel frame, cold strip mill. $9,000,000.

Pa., Phila.—River Park Regional Shopping Center, c/o Wm. J. McCarter & Co., Liberty Trust Bldg., plans by Welton Becket, consult. engr.-archt., 5657 Wilshire Blvd., Los Angeles, Calif., shopping center, incl. 12 story Presidential Hotel, 12 story office bldg., Schuylkill Expressway and City Line. $40,000,000.

Tex., El Paso—Catalytic Cracker Plant, El Paso, solvents production plant, Incl. 9,000 bbl. daily capacity crude oil products unit. $15,000,000.

Tex., Pasadena—Phillips Chemical Co., Pasadena, plant to mfg. methyl-vinylpyridine. $3,119,000.

Ont., Toronto—International Realty Co., 190 Yonge St., 14 story, 1,000 suite apartment block, Yonge and Alexander Sts. $8,000,000.



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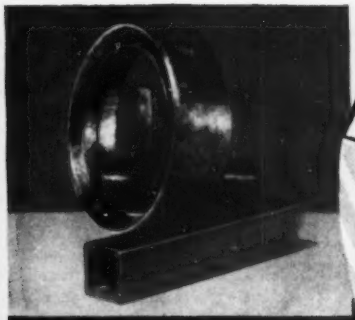

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POWER BRIEFS

● The first of two 54,000-kw generators at Pacific Power & Light Co's Yale hydroelectric project in southwest Washington recently passed its mechanical tests. The second generator is scheduled to go into operation next month.

● Pennsylvania Electric Co has purchased 500 acres of land from U. S. Steel Co for location of an electric generating station sometime in the future. The utility paid $80,000 for the property which lies north of the Lake Road at North Girard, Pa. The site has a frontage of 1½ miles on Lake Erie, west of Elk Creek. The company has no immediate plans to build on the site.

● World record for tunnel-driving through rock was claimed during the week of Oct. 19-25 at Kemano, B. C., by crews working on an Aluminum Co of Canada project. Workmen drove their "heading" 258 ft, breaking the record they had set in September when they cut 248 ft at the same heading.

● The second 150,000-kw steam-electric generating unit went into operation this month at Indiana & Michigan Electric Co's Tanners Creek Plant. A third unit of 200,000 kw is under construction at the plant. Indiana & Michigan is a subsidiary of American Gas & Electric Co.

● Consumers Power Co has purchased a 71-acre building site just north of Jackson, Mich., to provide for future expansion of the company.

● New generating capacity has been added by the Mexican government to alleviate the power shortage in the northern state of Chihuahua. A new plant built by the Federal Electric Commission at a cost of $10 million has gone into operation. It has two units of 15,000 kw each and a third of similar size is being installed. At Juarez, across the border from El Paso, Tex., a 5,000-kw unit has gone on the line.

● Citizens of Whiting, Iowa, have voted 233 to 40 to sell their municipal electric plant to Iowa Public Service Co and by a vote of 239 to 37 have granted the utility a 25-year franchise to serve the town. In return the company agreed to build a street lighting system and improve the distribution system.

DIECK
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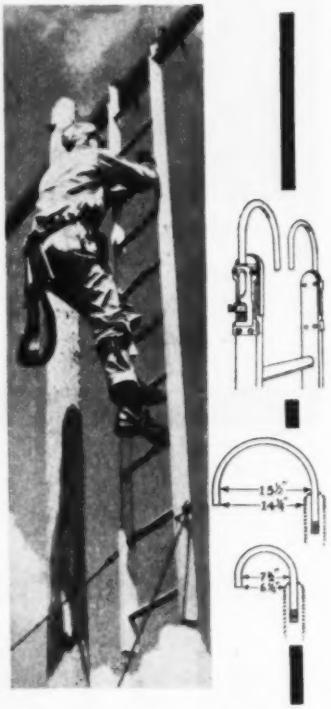

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DIECK TOOLS

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● Kansas Gas & Electric Co expects to start work on a new seven-story office building in downtown Wichita early next year. Bids probably will be let in January. Plans for the $1-million building are being detailed now. The new structure will be erected at the site of the present building and some general office personnel will be moved temporarily to a service building on the outskirts of Wichita during demolition of the old building and construction of the new.

● University of Washington will conduct an investigation leading to long-range streamflow forecasting in the Columbia River Basin as required for power, under a two-year contract negotiated with Bonneville Power Administration. The study will be undertaken by the Departments of Civil Engineering and of Climatology and Meteorology. Studies will deal with effect of temperature on the melting of snow, distribution of rainfall and runoff, correlation of data with seasons, temperatures, etc. and statistical studies to determine the applicability of theories of pattern and persistence to flow forecasting.

● When private industry starts investing its money in atomic plants for power production, atomic energy will be on its way towards "wide and beneficial" use by the people, Dr W. I. Patnode declared recently. The assistant to the general manager at the Hanford Works for technical matters added that the "good and useful" aspects of atomic energy can only be discovered by "men who are free to explore, free to inquire, free to experiment."

● Ontario Hydro-Electric Commission may be able to suggest a few additional ways of building up load to other utilities. The commission discovered a number of unusual uses of electricity in the course of converting Southern Ontario from 25-cycle to 60-cycle power. One man in Toronto, for example, uses electricity to let his cat in or out. He trained the cat to step on a treadle which activates a motor which, in turn, opens the cat-sized door of one of the panes of the basement window. A Windsor man fixed his door bell so his deaf wife could "hear" it. When the bell rings, the motor rotates a fan under the floor of each room which thumps against the floor and sets up a vibration she can feel. Ringing the bell also flashes on lights in several rooms.

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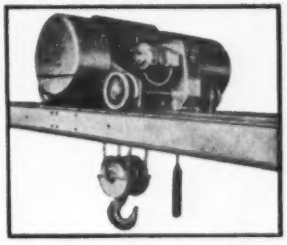

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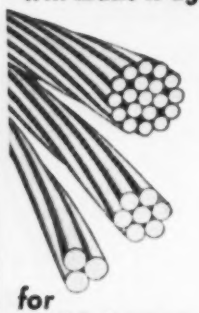

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TECHNICAL LITERATURE

Miniature Fixed Ratio Speed Changers—The perfect solution to fixed ratio gearing problems in instruments, servomechanisms, controls, regulators, etc. in fact for all low power devices is described in a new booklet. Two different series are available, one for anti-backlash applications. Both series are offered in over 400 ratios. It is available to interested readers by writing direct to Metron Instrument Co, 432 Lincoln St, Denver, Colorado.

Current Transformers: Bulletin 3AA—Gives details on new 2¼" large window "Donut" current transformers. This transformer provides an inexpensive method of extending the range of ammeters when used for determining current flow in large conductors. Bulletin sent free upon request to Associated Research, Incorporated, 3760 W Belmont Avenue, Chicago 18, Illinois.

Fractional H. P. Motors—Being distributed now is a new sixty-six page book which gives complete carbon brush replacement data. Replacement brushes are listed under the appliance manufacturer's name (ABC Oil Burners, Airco Fans, etc.) as well as under the motor manufacturer's (Baldor, Century, etc.). The new catalog is completely indexed, profusely illustrated and easy to use. For a free copy, address the manufacturer: Becker Brothers Carbon Company, 3450 S 52nd Avenue, Cicero 50, Illinois.

Diesel Electric Generators—Diesel electric generator sets can be tailored to meet almost any power need, according to examples given by Caterpillar in its new booklet, "Generating Power and Profits." Pictures and descriptions tell of such varied applications as those for lumber mills, municipal power plants, hospitals, oilfields, television stations, construction jobs and gravel plants. Each application presented is an actual operating installation. Operation and fuel consumption are described. Testing is shown in progress. The postwar factory built entirely for the production of Diesel engines is pictured. Copies are available from Caterpillar Dealers or Caterpillar Tractor Co, Peoria 8, Ill.

Automatic Copy Machine—A new booklet describing the Model 14 Copyflex machine has just been issued. This literature describes a machine which is the first of its kind valuable in handling production control systems, inventory records, and other paperwork essential to every type of manufacturing. Interested pensions may receive further information by contacting the Charles Bruning Company, Inc, 965 Commonwealth Ave, Boston 15, Mass. Bruning representatives can also be found in all principal cities throughout the United States.

Flow Meters—The Penn Industrial Instrument Corp, Penn Bldg, 4110 Haverford Ave, Philadelphia, Pa has issued a new brochure containing a reprint of an article on flow meters by T. V. Mullen in Electrical World. This Reprint No. 1000 is available upon request to the company mentioned above.

Solderless Terminals—Two new illustrated booklets which present the highlights of the industrial films, "All's Well That Ends Well" and "By the Millions" have just been published by Aircraft-Marine Products, Inc, 2100 Paxton St., Harrisburg, Pa. manufacturer of solderless terminals. These pocket-size books are intended primarily for distribution to audiences preceding the showing of the films. However,

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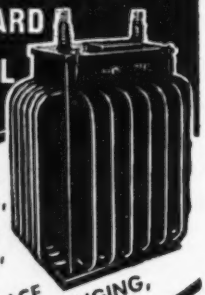

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they are also useful and informative in their own right. "All's Well That Ends Well" demonstrates the use and application of solderless terminals with precision hand tools. "By the Millions" shows how solderless terminals in strips fed from reels can be applied to wire at rates of up to 4000 per hour with automatic machines. Requests for copies of the booklets and for further details regarding the films will receive prompt attention.

Lighting Booklets—A 20-page booklet with 63 ideas for large scale Christmas lighting schemes is now available. The designs, which are presented through line drawings in the new booklet, show how store fronts, streets, schools and community houses can be decorated for the Christmas season. A similar but smaller booklet for home owners is also available. This 11 page booklet gives picture examples of outdoor and indoor displays, describes each and tells the reader how to construct them. For copies of these booklets write Westinghouse Lighting Department, Box 420, Bloomfield, N. J.

Magamp Regulators—Application of the Magamp regulator to the various control problems found in steel mill processes is discussed in a new 19-page booklet now being distributed. The use of Magamp regulators in nine different steel processing operations is also covered. Among these are tension control for temper-pass mills, control for tandem cold-reduction mills, speed regulation for rod and merchant mills, and control for high-speed slitting and shearing lines. In each case, a flow chart and a schematic diagram are given. For a copy of this booklet, B-5468, write Westinghouse Electric Corporation, Box 2099, Pittsburgh 30, Pennsylvania.

Mobilex Lighting System—A new and flexible system of recessed lighting, the Mobilex, has been announced in technical paper by Day-Brite Lighting, 5411 Bulmer Ave, St Louis 7, Mo. This Mobilex system is completely flexible, interchangeable and modern in design. It is architecturally harmonious with today's interiors and trend-setting for those of tomorrow. Stores, offices, display areas in buildings, both new and old, will find ready use for this new system of recessed lighting elements. This system allows unlimited design possibilities as far as patterns of light are concerned. Tees, squares, crosses, re-tangles, abstract patterns, or a completely luminous ceiling, can all be easily designed and installed with this system. For further data contact the company.

Annual Report 1951—The National Bureau of Standards Miscellaneous Publication 204, 105 pages, 28 halftone illustrations, and priced at 50 cents is available on order from Government Printing Office, Washington 25, D. C. Summarizing scientific and engineering investigations conducted by NBS during the fiscal year 1951, this booklet contains accounts of current activities as well as more detailed descriptions of especially important scientific developments. Its text provides a general description of work done in the 15 scientific and technical divisions and gives many specific examples of significant projects at NBS during the year.

Concentric Connectors—A comprehensive range of EHT concentric connectors manufactured by the Plessey Co Limited Ilford, Essex, England is now described in a brochure available to manufacturers. Small in size and possessing high insulation properties at extremes of climatic temperature and atmospheric pressure, these connectors effectively pass high unmatched voltages without loss of characteristic. They are highly resistant to dimensional instability and mechanical failure. For further information write the company.

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CATALOGS • BULLETINS

● **AUTOMATIC VOLTAGE STABILIZERS:** A new 12-page, two-color bulletin on automatic voltage stabilizers ranging from 15 to 5,000 volt amperes has been announced as available from the General Electric Company, Schenectady 5, N. Y. The booklet (GEA-5754) contains photographs and diagrams of the equipment, explains operation principles and construction, and gives complete specifications. It also describes the causes and effects of voltage variations and lists typical applications for stabilizers.

● **OVENS AND FURNACES:** The Cooley Electric Mfg Corp announce the publication of their new catalog "Electric Ovens and Furnaces." It is complete with illustrations and specifications; describes general purpose electric furnaces, bench and floor type, high speed electric furnaces, recirculating furnaces, electric ovens, industrial box furnaces, and cooley control equipment accessories. For catalog and complete information write Cooley Electric Mfg. Corp., 38 South Shelby St., Indianapolis 7, Indiana.

● **MULTIPLE BURNER PROTECTO-GLO SYSTEMS:** Bulletin 9603 contains data on combustion safeguard systems for industrial ovens, furnaces and other heat treating applications fired by multiple oil or gas burners. Bulletin describes system components, lists light-off options available and includes dimensional and operational data. It is available from the Minneapolis Honeywell Co, Wayne & Windrim Aves., Philadelphia, Pa.

● **MANUAL CONTROLS:** A new four-page bulletin on the Type M2C Autronic Manual Controls is announced by The Swartwout Company, Cleveland, Ohio, manufacturer of electronic process control and power plant equipment. Printed in two colors and illustrated with photographs, phantom and schematic views, the bulletin gives details on features, operating principles, and performance characteristics. Copies of Bulletin A-705 titled "Swartwout Autronic Manual Controls" are available on request to The Swartwout Company, 18511 Euclid Avenue, Cleveland 12, Ohio.

● **CHEMICAL PROCESSING:** A 15-page booklet that catalogs and describes electrical equipment for chemical processing is now being distributed. Divided into three main sections, power generation, distribution, and utilization, this booklet illustrates and explains the function of electric equipment as varied as turbine-generators and bus duct. Apparatus such as power centers, rectifiers, chemical motors and controls, and adjustable speed drives are covered concisely, giving only the standout characteristics and advantages of each of the chemical processing industry. Where applicable, circuit diagrams, ratings, and installation pictures are presented. For a copy of this booklet, B-5656, write Westinghouse Electric Corporation, Box 2099, Pittsburgh 30, Pennsylvania.

● **TRACTORS**—Moving big loads over long hauls at high speeds constitutes the type of work presented in "Big Producer," a booklet published by Caterpillar Tractor Co, Peoria 8, Ill. The title of the booklet is used to denote the "Cat" DW21 Tractor with No. 21 Scraper. This four-wheel combination is described as having a maximum speed of 20 mph, a heaped capacity of 20 cu. yds. and a 225 horsepower rating. Action pictures and descriptions tell of the uses of this equipment. It is shown loading, hauling, dumping and turning and operating characteristics are given.

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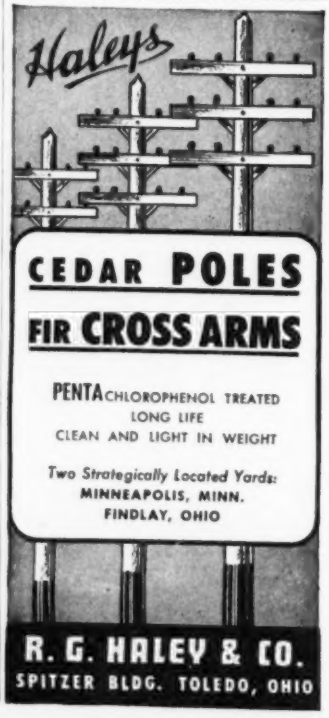

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●ELECTROMETERS: A new data sheet describes the application and operation of this vibrating reed type instrument. It delineates various important electrical characteristics and features of the equipment and discusses the theory of operation, stability and reliability of response, zero checking and other important details concerning this recording instrument which has proved to be a useful tool in nuclear radiation studies. Interested persons may write to Mr. S. D. Ross, Manager, Editorial Dept for additional data.

●POWER-FOR-STEEL BOOKLET: An extensive 36-page revision of the power-for-steel booklet is now available. This booklet concisely reviews past developments in the application of electric power to the steel industry, then describes the advances being made in present day equipment and processing lines. In many cases, sharp contrast between the old and the new is provided by side-by-side illustrations and text. Among the topics discussed are slip regulators, reversing hot strip mills and cold reduction mills, X-ray thickness gauges, and arc furnaces. Characteristics of each type of present-day equipment that are especially advantageous to the steel producer or processor are explained. For a copy of this booklet, B-5443, write Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pennsylvania.

●MAGNETIC ALLOYS: An 8-page, "what is it," "where to use it" booklet on magnetic alloys has been prepared recently. The various alloys that are covered in the booklet include Hipernik, Hipernik V, Conpernik, and Hiperco. The first three materials mentioned are iron-nickel alloys while the last is iron-cobalt alloy. These materials provide a wide range of magnetic properties needed for many special requirements. Physical and magnetic property tables together with the availability of each alloy are included. These are accompanied by a discussion of individual alloy heat treatment techniques. The inclusion of fifteen core loss and magnetization curves makes the booklet especially valuable when matching the correct alloy with a specific application. For a copy of this booklet, TD-52-100, write Westinghouse Electric Corporation, Box 2099, Pittsburgh 30, Pa.

●CABLE BOXES: A new bulletin has been issued recently by G & W Electric Specialty Company, 7780 Dante Avenue, Chicago 19, Illinois. It outlines in detail a comprehensive line of cable boxes for plain splicing—for solid inter-connecting, for sectionalizing, with links or fuses, electric insulated cable circuits for system flexibility. It is complete with photographs, outline dimensions of drawings, ratings, and descriptive data. Copies can be obtained by writing for Bulletin IIA-52.

● TUNGAR BULBS—A new, 8-page, two-color data manual on Tungar bulbs (used for rectifying a-c power to d-c) has been announced as available from the General Electric Company, Schenectady 5, N. Y. Designated GEA-5677, the brochure contains charts and graphs illustrating the characteristics, construction, operation, and application of G-E Tungar bulbs.

● ELECTRIC POWER FOR OPEN-PIT MINES AND QUARRIES—A comprehensive 39 page book on "electric power distribution and protection for open-pit mines and quarries" is currently being issued. Emphasizing that a properly engineered installation minimizes hazards and improves continuity of operation, this book discusses the complete electrical system for open-pit mines and quarries, from initial power distribution to maintenance of apparatus. Ratings of transformers, shovel performance, power factor correction, and distribution system layouts for different types of mines are covered in the first portion of the book. Write for a copy of this book, B5447, to Westinghouse Electric Corporation, Box 2099, Pittsburgh 30, Pennsylvania.

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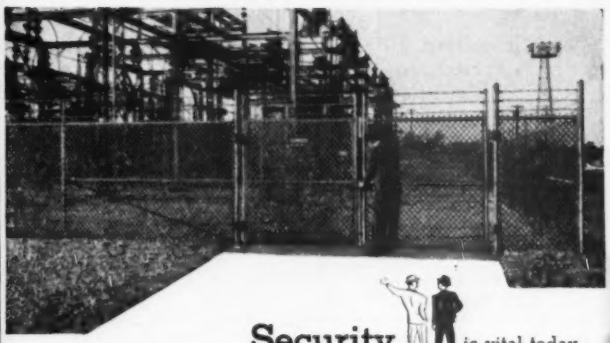

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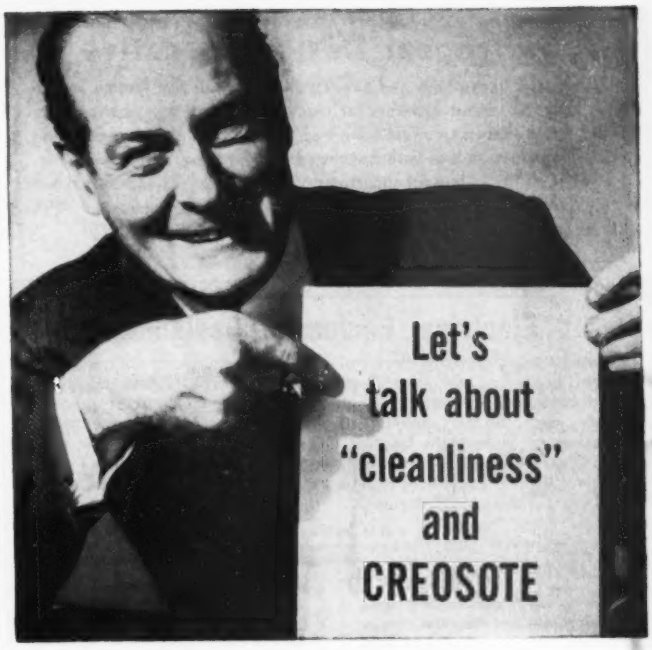

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6	300	Westg.	69000—6900
3	200	Pitts.	66000—2300
2	75	A. C.	66000/24000—7200/12470 Y
3	200	A. C.	66000—2400/7200
4	150	Westg.	44000/33000—2300/6900
4	100	G. E.	44000—2300
2	75	Westg.	44000—7200/12470 Y
4	5000	G. E.	40935/70900 Y—14500
3	5000	G. E.	38100/66000—6600
1	18750	A.B.B.	34840—11000, 3 ph.
2	5000	Westg.	33000—26400, 13200, 3 ph.
3	200	A. C.	34500—2400/7200-12470 Y
4	200	G. E.	34500—230, 460
2	100	Westg.	33000—240/480 NEW
3	100	A. C.	33000—7200/12470 Y
3	75	Wag.	33000—7200/12470Y
6	2125	G. E.	26400/13200—2300
1	1500	A. C.	25400/14000 Y—6900/13800
4	450	A. C.	25410/14000—13280/25000
6	100	G. E.	22000—7200/12470 Y
9	50	G. E.	22000—2300
1	6000	Mes.	13800—460, 3 ph.
1	450	Penn.	13200—2400, 3 ph.
3	200	G. E.	13800—2300
1	3750	G. E.	1 000—2300, 3 ph.
4	750	G. E.	17000—440
3	250	Pitts.	7200—220/440
3	150	Wag.	6900—2300
1	37½	G. E.	6900—230/460
2	100	G. E.	4800/2400—480/240
3	1500	A. C.	2300/4000 Y—2300
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6	50	West.	2400—114/228, DRY TYPE

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1—	750	G.E.	Condensing—265 lbs., 440-3-60 Built 1944
1—	500	Moore	Non-Cond—150/200 lbs., 5/35 lbs. B.P., 480-3-60 Dir. Conn. Exciter
1—	400	Westgh.	Non-Cond.—125/150 lbs., 5/10 lbs. B.P., 240/480-3-60
1—	300	G.E.	Non-Cond.—150/175 lbs., 5/10 lbs. B.P., 480-3-60

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KVA	Make	RPM	Voltages	Frequency
1—3750	G.E.	300	2400/4150—2400/4150	25/60/25
1—3125	G.E.	300	2400/4150—2400/4150	25/60/25
2—2500	G.E.	750	2400/4150—2400/4150	25/62½/60/24

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2—	2000	G.E.	600	600	25 cy. 11000
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1—	1500	G.E.	360	275	2300/4400
3—	1500	G.E.	514	250	6600/13200
2—	1500	G.E.	60t	600	2300/4150
1—	1000	G.E.	900	260	4100/6900
2—	1000	Whse.	900	600	2300/4150
1—	800	Whse.	900	250	6600/13200
1—	500	Whse.	1200	125/250	2300
1—	500	Whse.	900	250	440
1—	500	G.E.	720	125	2300
1—	400	G.E.	720	250	440/2300
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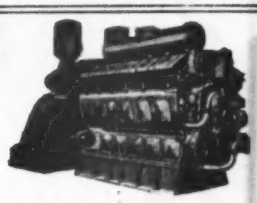

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1100	General Motors	16-278A	1600	720	300	General Motors	8-268A	450	1200
1000	General Motors	16-567B	1440	720	250	Fairbanks Morse	37-E	375	360
750	General Motors	12-567	1080	720	200	General Motors	6-268A	350	900
600	Baldwin	VO-6	750	514	100	Worthington	BB-5	150	600
600	General Motors	12-278A	750	720	100	General Motors	3-268A	150	1200
600	General Motors	8-567	720	720	60	General Motors	6-71	90	1200
400	Ingersoll-Rand	S-6	600	720	30	International Harvester	UD-14	45	1200
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1— 100 KW G.E., 250V, 900 RPM, 2300V, 3 Syn.
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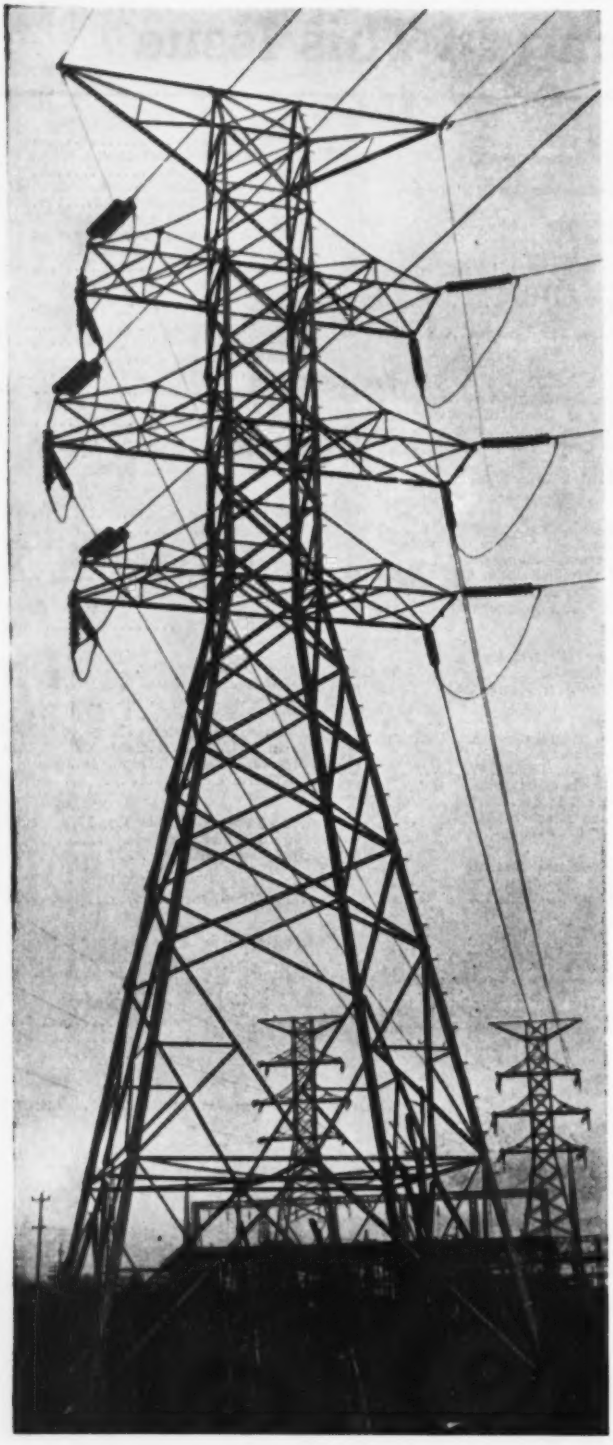

TRANSMISSION TOWERS BY BETHLEHEM

Utilities can put their requirements for transmission towers up to Bethlehem knowing that the work will be handled to their complete satisfaction.

Back of transmission towers we fabricate are more than fifty years of experience in handling the design and fabrication of practically every type of tower. We have three large tower-fabricating shops: at Leetsdale, Pa., near Pittsburgh, at South San Francisco, Calif., and at Seattle, Wash. Each of these shops is staffed with people who know transmission tower work from A to Z, and is equipped to handle every phase of fabrication, including galvanizing.

Whenever you need single-circuit or double-circuit transmission towers, have a Bethlehem representative call to discuss your requirements in detail.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast the fabrication of transmission towers is handled by Bethlehem Pacific Coast Steel Corporation
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BETHLEHEM STEEL

This H-20, 154kv double-circuit tower near Nashville, Tenn., is representative of hundreds of TVA towers fabricated by Bethlehem. Height to bottom crossarm, 64 ft; conductors: (6), 795,000 cm ACSR 26/7; horizontal separations, top and bottom conductors: 31 ft; ground wires: 7/16 in. HS steel.

5/8% STEP VOLTAGE REGULATORS

Keep Revenue Up

as feeder loads increase

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Best of all, you've got a flexible tool for solving voltage problems anywhere. Allis-Chalmers distribution regulators are easy to mount — they can be shifted from feeder to feeder easily as changing loads require.

Don't let rising loads cut into profits. Call your nearest A-C district office for full information. Or write Allis-Chalmers, Milwaukee 1, Wis.

A-3881

RATINGS AVAILABLE	7620 Volts—15, 50, 100 amp 5000 Volts—50, 100 amp 2500 Volts—100, 200 amp

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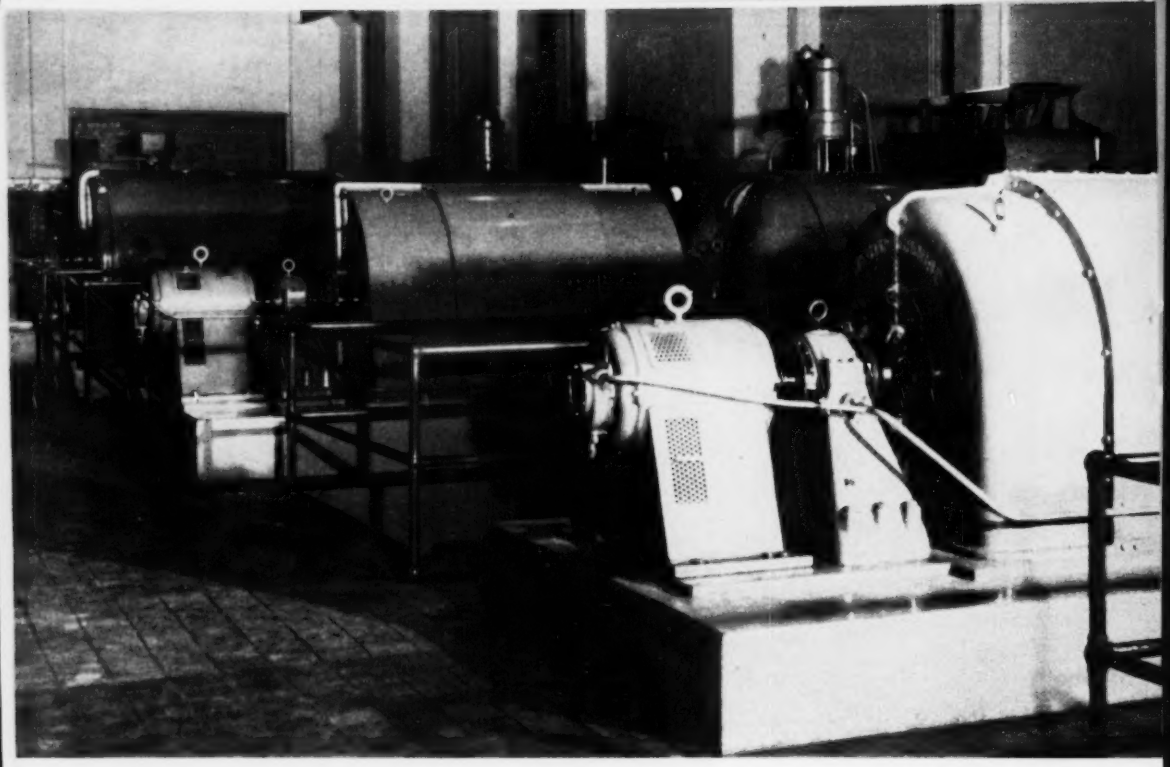
Get all the facts. Write for bulletin 01M7866-1.

ALLIS-CHALMERS

Originators of 5/8% Step Regulation



Turbine oil with a past . . . and future

• The story of NONPAREIL Turbine Oil in the Water and Light Commission plant, Fairmont, Minnesota, is one of a long successful past and a guaranteed trouble-free future. It's a typical story of the kind of performance offered by NONPAREIL Turbine Oil.

NONPAREIL
TRADE MARK
Turbine Oil

In 1929, NONPAREIL got its start in this plant by solving a sludge problem in a 1500-KW unit. Water could not be separated from the conventional lubricant previously used, and sludge had resulted. Good separation was obtained with NONPAREIL, and sludge troubles were eliminated.

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None of the original fills of oil has ever been removed from the four turbines, either for reconditioning of the oil or for cleaning of the lubrication systems. Neutralization numbers of the oil fills have remained below 0.09 mg. KOH/gm. There have been no failures or troubles of any kind caused by faulty lubrication.

That's the past of NONPAREIL Turbine Oil in this plant—23 years of trouble-free, cost-free lubrication. What's more, the same effective lubrication is assured for the life of these turbines. Each fill of NONPAREIL is guaranteed by Standard Oil to last for the life of the turbine it lubricates and to maintain a neutralization number below 0.15 mg. KOH/gm.

A Standard Oil lubrication specialist will be glad to show you lubrication records of NONPAREIL in installations similar to your own. In the Midwest, you can contact him by phoning your local Standard Oil office. Or write: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY **STANDARD** *(Indiana)*